Smithsonian

MARCH 2001

Spring Reigns in Brussels' Palace of Glass

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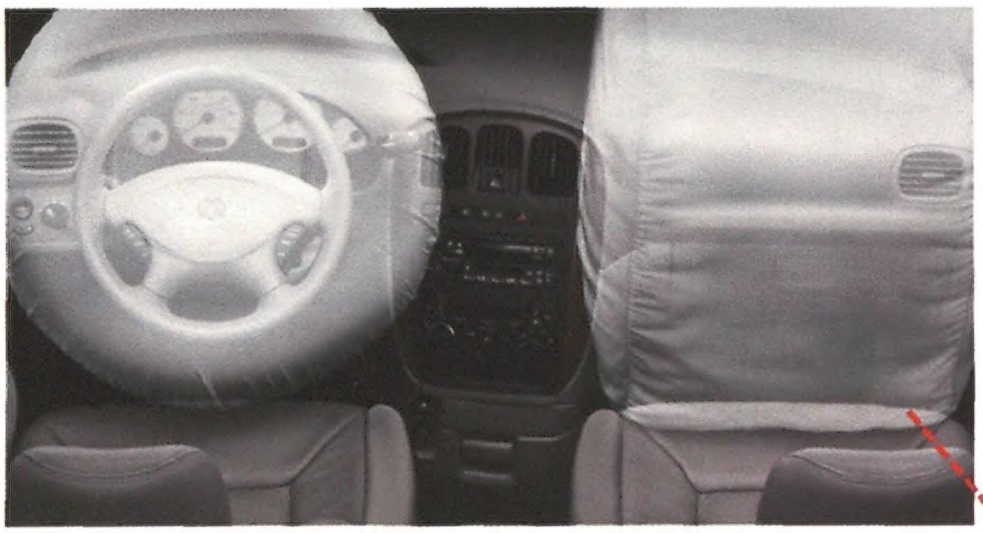
It's not a minivan.



The Next Generation multistage driver and front passenger airbags in the all-new Dodge Caravan are so smart, they deploy at different levels, depending on crash severity.[1] In addition, Caravan watches out for you with improved head impact protection.

Additional peace of mind comes from the all-new Caravan's available front-seat supplemental side airbags. In the event of a side impact, they offer extra protection to not only the head, but the chest area as well. We've even redesigned the armrests in the doors to improve side impact protection.

Of course, the all-new Caravan features seat belt height adjusters for front and intermediate seats to help make it safe and comfortable for different size drivers and passengers. Plus, front seat belt pretensioners and constant-force retractors to help minimize the force of an impact.

The all-new Caravan is the only minivan to offer all-wheel drive and four-wheel disc braking. Coupled with available anti-lock brakes, it's a potent combination of accident avoidance systems. After all, it's a whole lot better to maneuver around a tough spot than to be in one.

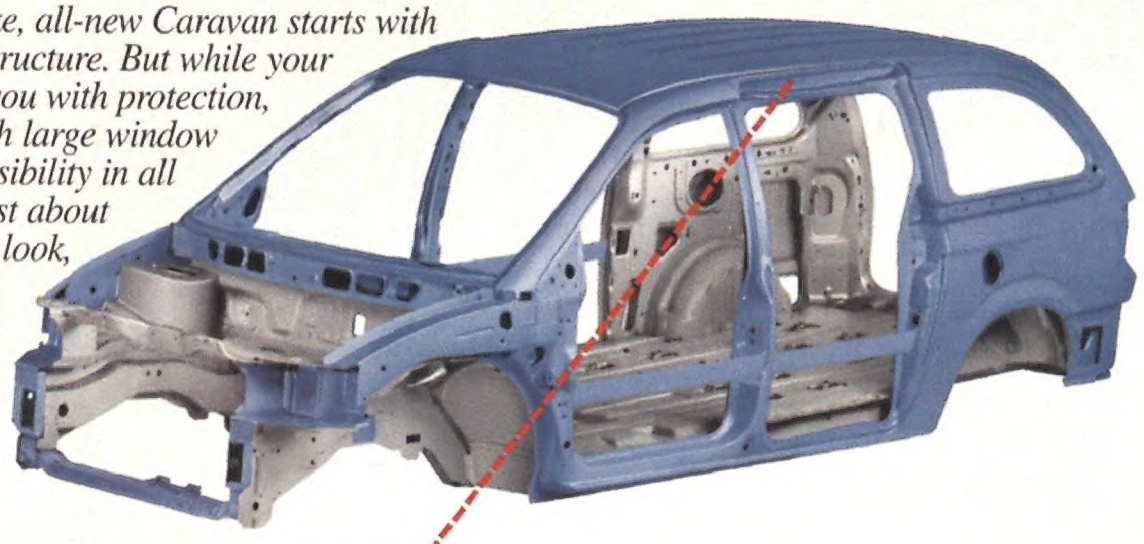
The 3.3 and 3.8 liter V-6 engines available in the all-new Caravan have been redesigned to be smoother, quieter, and more powerful to make merging and passing easier and safer.

A refined suspension system gives you improved handling and steering precision.

In case of emergency, you want to make sure you're in the right vehicle. Which leads you right to the door of the all-new Caravan.

[1]Always use seat belts. Remember, a backseat is the safest place for children 12 and under. [2]Operates when electrical system is intact. [3]Detects most obstacles. As with all electronically controlled systems, care is advised. [4]For use with latch-compatible aftermarket child seats. For children at least one year old, weighing between 22 and 50 lbs., and no more than 47 inches tall. [5]Based on AMCI overall weighted evaluations of 2001 Grand Caravan vs. similarly-equipped 2000 MY competitors. Call 800-4-A-DODGE for details.

Safety in the vault-like, all-new Caravan starts with a safety-cage body structure. But while your Caravan surrounds you with protection, it's also designed with large window openings for great visibility in all directions. In fact, just about no matter where you look, you'll find proof of Dodge's commitment to safety in the all-new Caravan.



In addition to the available integrated child seat, the all-new Caravan features a quick and easy child seat anchor system that attaches directly to the seat itself rather than the seat belt.[4]

It may seem like a little thing, but big mirrors can be a big thing when it comes to helping to keep accidents from sneaking up on you from behind.

In the event of certain types of accidents, the Emergency Accident Response System unlocks the doors and turns on the interior lights to help you exit safely.[2]

Standard on the new Grand Caravan ES are power-activated sliding side doors and the first-ever available power-activated rear hatch. For safety's sake, they feature the most sophisticated auto reverse system in the class. It reverses immediately, whether opening or closing, if an obstacle is detected.[3] Another Caravan first. And, as always, safety first.

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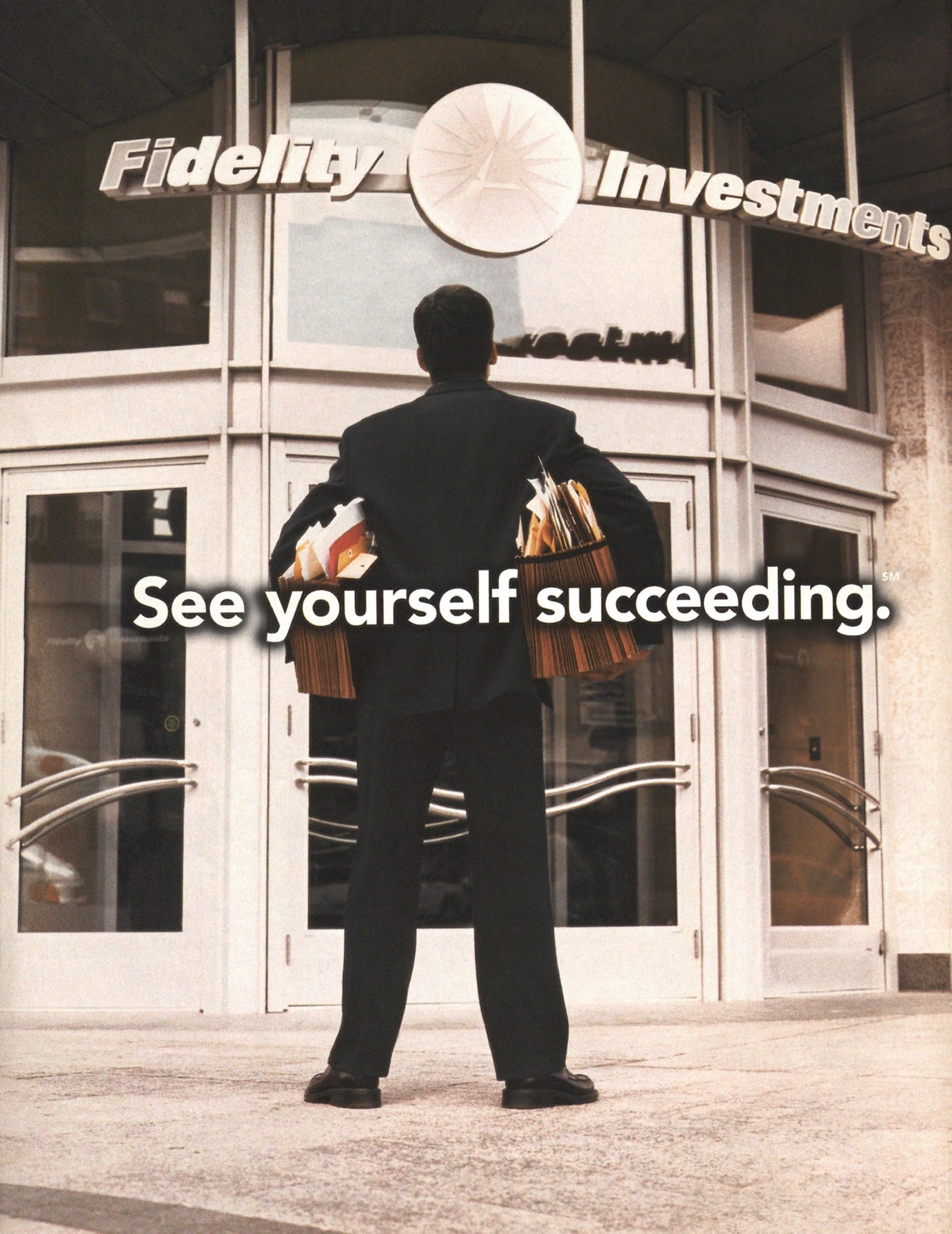
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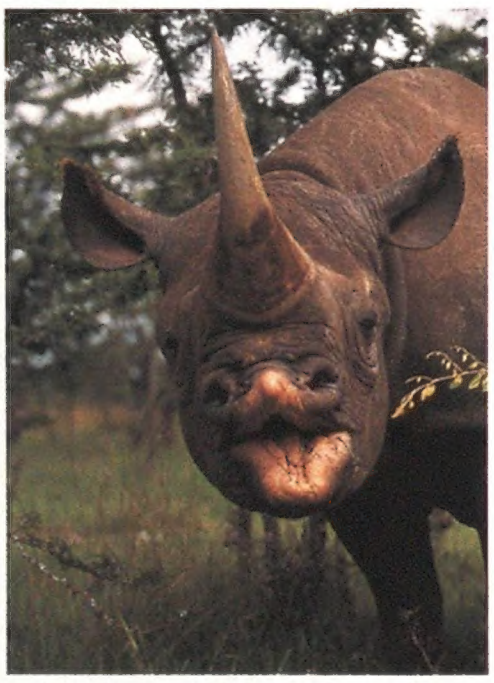

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Cover A blue-and-white Chinese pot shows off an asparagus fern in the Diana Greenhouse, one of a series of interconnected greenhouses at Laeken, in Brussels, Belgium. The masterwork of King Leopold II, the complex contains one of the largest and finest private botanical collections in the world.
PHOTOGRAPH BY SKY BERGMAN

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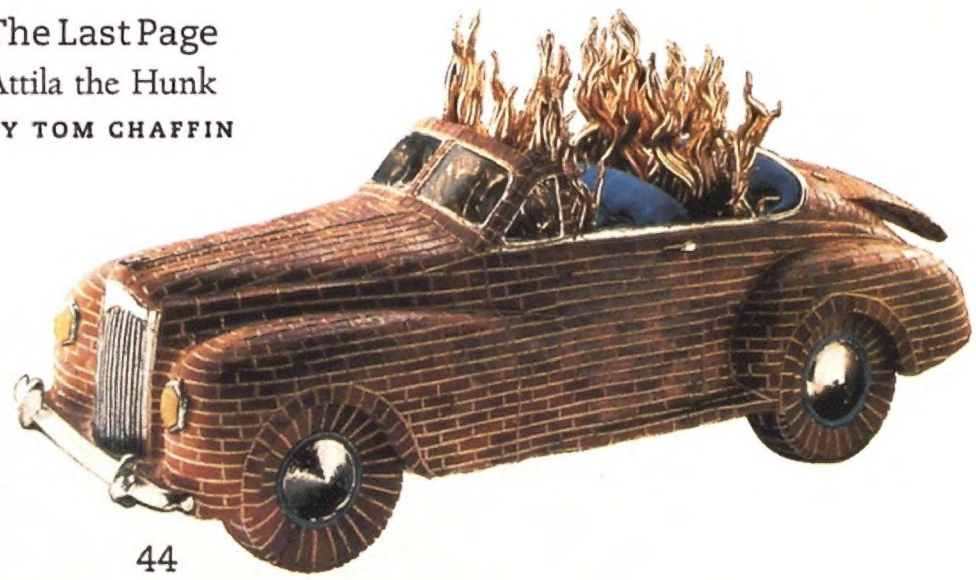

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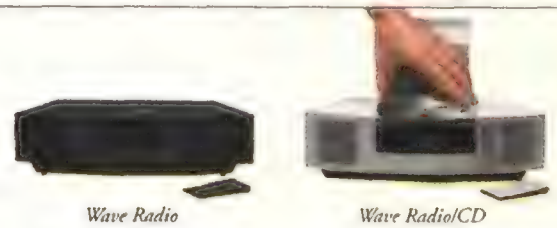

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Smithson's Best Bet

A NOTE FROM THE SECRETARY

TRAVELING THE COUNTRY, I AM OFTEN ASKED HOW the Smithsonian began. The questioners expect a straightforward explanation, but names and dates, facts and figures, can't resolve a fundamental mystery about the origin of the Institution. In a sense, the Smithsonian rests on the outcome of a bet, and that makes its beginning a lot more contingent—dicey, you might say—than you would expect for a place that's cast today in so much stone.

The relevant facts are these: in 1826 an English scientist named James Smithson made a will that left his considerable estate to a nephew—unless the nephew were to die childless, in which case the entire fortune was to go "to the United States of America to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase & diffusion of knowledge among men." The mystery is this: Why the option of generosity to America, a nation in which Smithson had never set foot? What was the unspoken impulse behind the puzzling gesture?

James Smithson, here in an 1816 portrait by Henri-Joseph Johns, put a fortune on America's future.

We can seek clues in Smithson's life. His father, Hugh Smithson, was the Earl of Northumberland by marriage (he was later, by action of Parliament, made Duke of Northumberland and given the name Percy). Alas, his mother was not the earl's wife but one of her cousins, who had an affair with Hugh at the fashionable resort of Bath in 1764. James Smithson was born out of wedlock the following year in Paris, at the highest level of society, to be sure, but subject to stigma nonetheless. Certain careers—in the army, the church, the civil service and politics, for example—were closed to him.

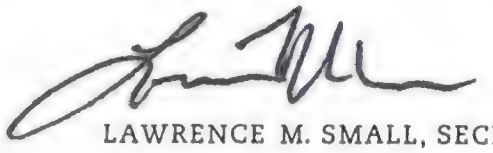
Smithson graduated in 1786 from Oxford, where he distinguished himself in chemistry and mineralogy, and he was elected the following year to the Royal Society, as its youngest member. There's no evidence that he ever saw his father. His wealth came to him from his mother. He maintained a lifelong interest in science and spent much of his life on the Continent, where criticism of Napoleon in 1807 won him five years in prison. In later life, he became a compulsive gambler. He made no wager more daring than that on his own immortality.

When we speak of Smithson's generosity to the United States, let's not forget that willing the estate to America was, formally, an alternative course. After Smithson died, in Genoa, Italy, in 1829, the fate of the bequest hung for years on the possible birth of a child. Then, in 1835, Smithson's nephew died "without issue" (the term seems appropriate to the era). So the United States of America won the prize, which was worth the then enormous sum of $508,318.46. Congress and the nation debated about the money and its purpose for a decade. Not until 1846 was there a Smithsonian Institution to put flesh on Smithson's noble but skeletal intent.

We can only surmise why James Smithson was willing to gamble his wealth on an establishment as indistinct as a dream. Did he look to America out of simple disaffection with an England that could not ignore the circumstances of his birth? Or was he drawn by a particular vision of the young nation—by an America of boundless social and intellectual possibility, where a man like Thomas Jefferson, a congenial spirit in the Enlightenment mode of Smithson himself, might hold the highest office?

We do know that Smithson once wrote the following: "My name shall live in the memory of man when the titles of the Northumberlands and the Percys are extinct and forgotten. . . . " The first alternative in his will promised a genteel obscurity for the Smithson name. The second held out the hope of something more. But that larger prospect was doubly contingent: the estate had to pass from the nephew, and a foreign land had to do right by the gift. Smithson won the bet, and his name endures, most vividly in a nation an ocean away from his own.

In 1904 James Smithson's remains were moved from Genoa. They were placed not in an English castle built by Northumberlands or Percys but in an American castle in Washington, D.C. that carries his name. That's a payoff even the most audacious gambler could not have foreseen.



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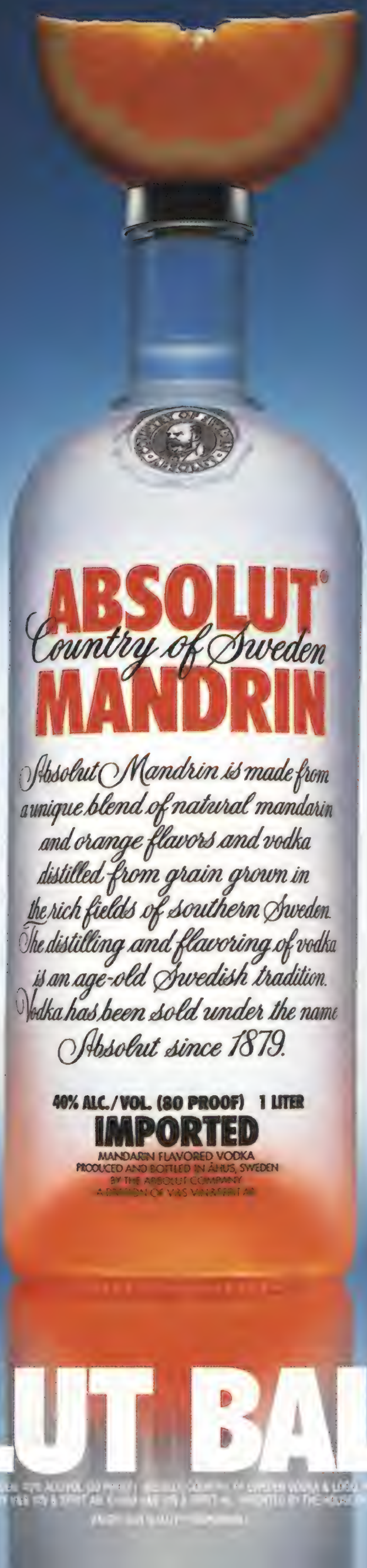
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Important considerations: ZOCOR is a prescription medicine and isn't right for everyone, including women who are nursing or pregnant or who may become pregnant, anyone with liver problems, and people who are allergic to any ingredients of ZOCOR. Unexplained muscle pain or weakness could be a sign of a rare but serious side effect and should be reported to your doctor right away. Your doctor may do blood tests before and during treatment with ZOCOR to check for liver problems. To avoid serious side effects, discuss with your doctor medicine or food you should avoid while on ZOCOR (see details immediately following this ad).

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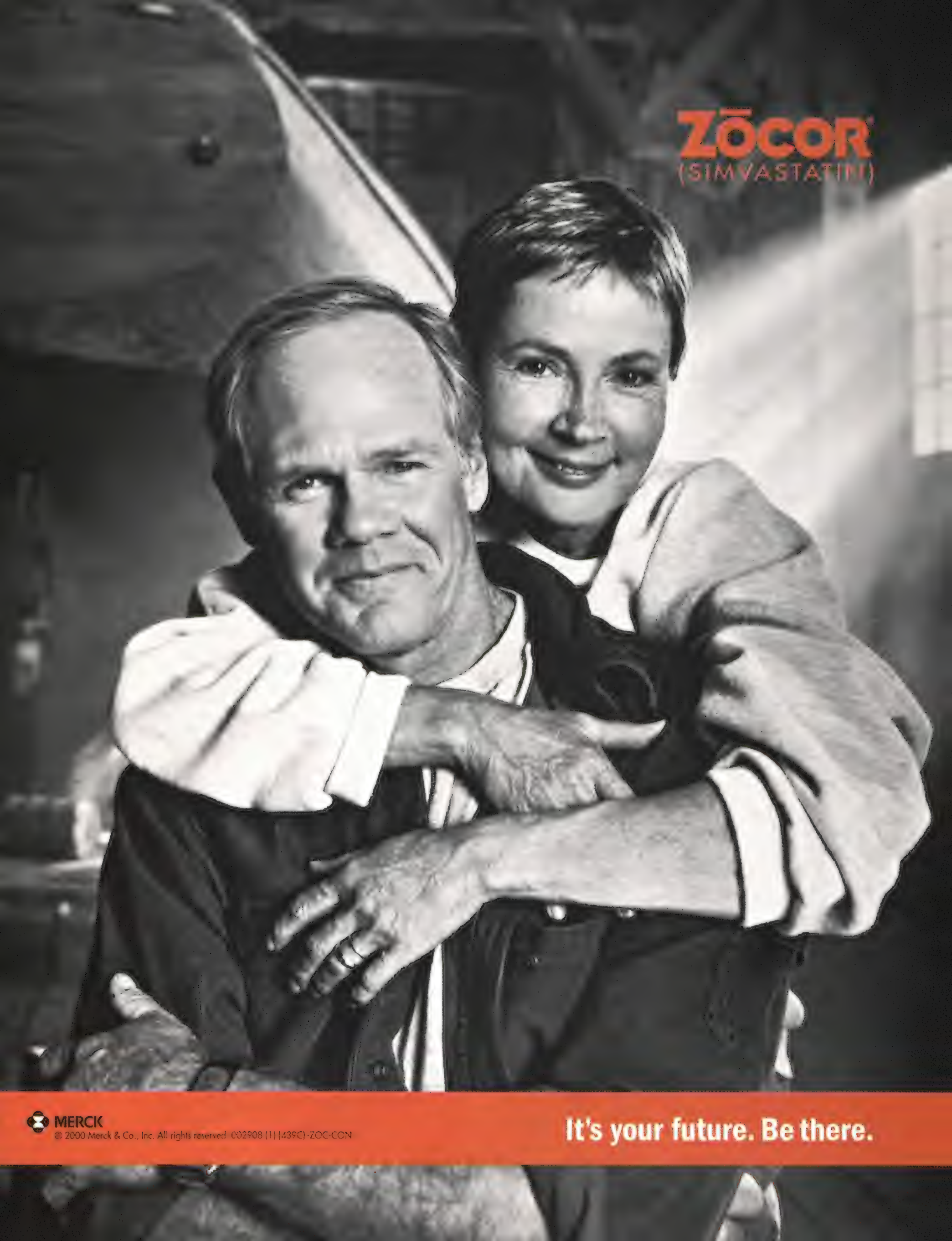
[1]42% reduction based on 111/2,221 (ZOCOR) vs 189/2,223 (placebo).



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PLEASE READ THIS SUMMARY CAREFULLY, AND THEN ASK YOUR DOCTOR ABOUT ZOCOR. NO ADVERTISEMENT CAN PROVIDE ALL THE INFORMATION NEEDED TO PRESCRIBE A DRUG. THIS ADVERTISEMENT DOES NOT TAKE THE PLACE OF CAREFUL DISCUSSIONS WITH YOUR DOCTOR. ONLY YOUR DOCTOR HAS THE TRAINING TO WEIGH THE RISKS AND BENEFITS OF A PRESCRIPTION DRUG FOR YOU.

USES OF ZOCOR

ZOCOR is a prescription drug that is indicated as an addition to diet for many patients with high cholesterol when diet and exercise are inadequate. For patients with coronary heart disease (CHD) and high cholesterol, ZOCOR is indicated as an addition to diet to reduce the risk of death by reducing coronary death; to reduce the risk of heart attack; to reduce the risk for undergoing cardiac procedures (coronary artery bypass grafting and percutaneous transluminal coronary angioplasty); and to reduce the risk of stroke or transient ischemic attack (TIA).

WHEN ZOCOR SHOULD NOT BE USED

Some people should not take ZOCOR. Discuss this with your doctor.

ZOCOR should not be used by patients who are allergic to any of its ingredients. In addition to the active ingredient simvastatin, each tablet contains the following inactive ingredients: cellulose, lactose, *magnesium stearate, iron oxides, talc, titanium dioxide, and starch. Butylated hydroxyanisole is added* as a preservative.

Patients with liver problems: ZOCOR should not be used by patients with active liver disease or repeated blood test results indicating possible liver problems. (See WARNINGS.)

Women who are or may become pregnant: Pregnant women should not take ZOCOR because it may harm the fetus. **Women of childbearing age should not take ZOCOR unless it is highly unlikely that they will become pregnant.** If a woman does become pregnant while on ZOCOR, she should stop taking the drug and talk to her doctor at once.

Women who are breast-feeding should not take ZOCOR.

WARNINGS

Muscle: Tell your doctor right away if you experience any unexplained muscle pain, tenderness, or weakness at any time during treatment with ZOCOR so your doctor can decide if ZOCOR should be stopped. Some patients may have muscle pain or weakness while taking ZOCOR. Rarely, this can include muscle breakdown resulting in kidney damage. The risk of muscle breakdown is greater in patients taking certain other drugs along with ZOCOR, such as the lipid-lowering drug Lopid (gemfibrozil), and other fibrates; lipid-lowering doses of niacin (nicotinic acid); Sandimmune (cyclosporine); itraconazole, ketoconazole, and other azole antifungal drugs; the antibiotics erythromycin and clarithromycin; HIV protease inhibitors; the antidepressant nefazodone; and the calcium channel blocker verapamil. Interruption of therapy with ZOCOR should be considered if you are going to take an azole antifungal medication, such as itraconazole, or macrolide antibiotics, such as erythromycin. Avoid drinking large quantities of grapefruit juice (more than one quart daily) while on ZOCOR. The risk of muscle breakdown is greater in patients with kidney problems or diabetes.

Because there are risks in combining therapy with ZOCOR with the products listed above, your doctor should carefully weigh the potential benefits and risks. He or she should also carefully monitor patients for any muscle pain, tenderness, or weakness, particularly during the initial months of therapy and if the dose of either drug is increased. Your doctor also may monitor the level of certain muscle enzymes in your body, but there is no assurance that such monitoring will prevent the occurrence of severe muscle disease.

If you have conditions that can increase your risk of muscle breakdown, which in turn can cause kidney damage, your doctor should temporarily withhold or stop ZOCOR. Also, since there are no known adverse consequences of briefly stopping therapy with ZOCOR, treatment should be stopped a few days before elective major surgery and when any major acute medical or surgical condition occurs. Discuss this with your doctor, who can explain these conditions to you.

Liver: About 1% of patients who took ZOCOR in clinical trials developed elevated levels of some liver enzymes. Patients who had these increases usually had no symptoms. Elevated liver enzymes usually returned to normal levels when therapy with ZOCOR was stopped.

In the ZOCOR Survival Study, the number of patients with more than one liver enzyme level elevation to greater than 3 times the normal upper limit was no different between the ZOCOR and placebo groups. Only 8 patients on ZOCOR and 5 on placebo discontinued therapy due to elevated liver enzyme levels. Patients were started on 20 mg of ZOCOR, and one third had their dose raised to 40 mg.

Your doctor should perform routine blood tests to check these enzymes before you start treatment with ZOCOR and periodically thereafter (for example, semiannually) for your first year of treatment or until 1 year after your last elevation in dose. Patients titrated to the 80-mg dose should receive an additional test at 3 months. If your enzyme levels increase, your doctor should order more frequent tests. If your liver enzyme levels remain unusually high, your doctor should discontinue your medication.

Tell your doctor about any liver disease you may have had in the past and about how much alcohol you consume. ZOCOR should be used with caution in patients who consume large amounts of alcohol.

PRECAUTIONS

Before starting treatment with ZOCOR, try to lower your cholesterol by other methods such as diet, exercise, and weight loss. Ask your doctor about how best to do this. Any other medical problems that can cause high cholesterol should also be treated.

Drug Interactions: Because of possible serious drug interactions, it is important to tell your doctor what other drugs you are taking, including those obtained without a prescription.

ZOCOR® (simvastatin) can interact with cyclosporine (Sandimmune), itraconazole, ketoconazole, gemfibrozil, niacin, erythromycin, clarithromycin, HIV protease inhibitors, nefazodone, and verapamil.

To avoid possible serious side effects, avoid drinking large quantities of grapefruit juice (more than one quart daily) while on ZOCOR. (See WARNINGS, Muscle.)

Some patients taking lipid-lowering agents similar to ZOCOR and coumarin anticoagulants (a type of blood thinner) have experienced bleeding and/or increased blood clotting time. Patients taking these medicines should have their blood tested before starting therapy with ZOCOR and should continue to be monitored.

Central Nervous System Toxicity; Cancer, Mutations, Impairment of Fertility: Like most prescription drugs, ZOCOR was required to be tested on animals before it was marketed for human use. Often these tests were designed to achieve higher drug concentrations than humans achieve at recommended dosing. In some tests, the animals had damage to the nerves in the central nervous system. In studies of mice with high doses of ZOCOR, the likelihood of certain types of cancerous tumors increased. No evidence of mutations of or damage to genetic material has been seen. In one study with ZOCOR, there was decreased fertility in male rats.

Pregnancy: *Pregnant women should not take ZOCOR because it may harm the fetus.*

Safety in pregnancy has not been established. In studies with lipid-lowering agents similar to ZOCOR, there have been rare reports of birth defects of the skeleton and digestive system. Therefore, women of childbearing age should not take ZOCOR unless it is highly unlikely they will become pregnant. If a woman does become pregnant while taking ZOCOR, she should stop taking the drug and talk to her doctor at once. The active ingredient of ZOCOR did not cause birth defects in rats at 3 times the human dose or in rabbits at 3 times the human dose.

Nursing Mothers: Drugs taken by nursing mothers may be present in their breast milk. Because of the potential for serious adverse reactions in nursing infants, a woman taking ZOCOR should not breast-feed. (See WHEN ZOCOR SHOULD NOT BE USED.)

Pediatric Use: *ZOCOR is not recommended for children or patients under 20 years of age.*

SIDE EFFECTS

Most patients tolerate treatment with ZOCOR well; however, like all prescription drugs, ZOCOR can cause side effects, and some of them can be serious. Side effects that do occur are usually mild and short-lived. Only your doctor can weigh the risks versus the benefits of any prescription drug. In clinical studies with ZOCOR, less than 1.5% of patients dropped out of the studies because of side effects. In a large, long-term study, patients taking ZOCOR experienced similar side effects to those patients taking placebo (sugar pills). Some of the side effects that have been reported with ZOCOR or related drugs are listed below. This list is not complete. Be sure to ask your doctor about side effects before taking ZOCOR and to discuss any side effects that occur.

Digestive System: *Constipation, diarrhea, upset stomach, gas, heartburn, stomach pain/cramps,* anorexia, loss of appetite, nausea, inflammation of the pancreas, hepatitis, jaundice, fatty changes in the liver, and, rarely, severe liver damage and failure, cirrhosis, and liver cancer.

Muscle, Skeletal: Muscle cramps, aches, pain, and weakness; joint pain; muscle breakdown.

Nervous System: Dizziness, headache, insomnia, tingling, memory loss, damage to nerves causing weakness and/or loss of sensation and/or abnormal sensations, anxiety, depression, tremor, loss of balance, psychic disturbances.

Skin: Rash, itching, hair loss, dryness, nodules, discoloration.

Eye/Senses: Blurred vision, altered taste sensation, progression of cataracts, eye muscle weakness.

Hypersensitivity (Allergic) Reactions: On rare occasions, a wide variety of symptoms have been reported to occur either alone or together in groups (referred to as a syndrome) that appeared to be based on allergic-type reactions, which may rarely be fatal. These have included one or more of the following: a severe generalized reaction that may include shortness of breath, wheezing, digestive symptoms, and low blood pressure and even shock; an allergic reaction with swelling of the face, lips, tongue and/or throat with difficulty swallowing or breathing; symptoms mimicking lupus (a disorder in which a person's immune system may attack parts of his or her own body); severe muscle and blood vessel inflammation, sometimes including rash; bruises; various disorders of blood cells (that could result in anemia, infection, or blood clotting problems) or abnormal blood tests; inflamed or painful joints; hives; fatigue and weakness; sensitivity to sunlight; fever, chills; flushing; difficulty breathing; and severe skin disorders that vary from rash to a serious burn-like shedding of skin all over the body, including mucous membranes such as the lining of the mouth.

Other: Loss of sexual desire, breast enlargement, impotence.

Laboratory Tests: Liver function test abnormalities including elevated alkaline phosphatase and bilirubin; thyroid function abnormalities.

NOTE: This summary provides important information about ZOCOR. If you would like more information, ask your doctor or pharmacist to let you read the complete prescribing information and then discuss it with them.

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DESIGNER GENES

"BETTING ON DESIGNER GENES" BY Jeff Wheelwright, in the January 2001 issue, outlined for me the frightening possibility that people could be genetically engineered to be perfect, in the medical sense of the word, in the very near future. Working under the guise of benefiting the human race medically, researchers and doctors are creating a monster and ignoring the social implications of tampering with inherent genetic codes. The entire industry reeks of moral ineptitude concealed behind the curtain of medical valiancy, while dancing around the issues of eugenics and egomaniacal self-preservation of our intensely overpopulated world—not to mention the rapacious involvement of researchers and drug companies in fast-forwarding lucrative medical processes.

Mark Spencer
Washburn, Tennessee

I DEVOUR ARTICLES SUCH AS "BETting on Designer Genes" because my family has been horrendously affected by a faulty gene. Our granddaughter, Erin, has the Sanfilippo variation of a mucopolysaccharide disorder. Depending on the variation, MPS disorders blind, deafen, cripple, disfigure, mentally retard and ultimately kill children. Erin has regressed from a bright, active first grader to having profoundly lost her cognitive abilities. She can no longer maintain self-control and now shows symptoms of losing motor skills.

My heart aches for the Gelsinger family, whose son died during a gene therapy experiment at the University

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of Pennsylvania, but I was devastated to learn from your article that other institutions that had been using adenoviruses in humans have consequently decided to halt their gene therapy trials. For those of us facing the inevitable physical and mental degradation, followed by the premature death, of a loved child, any delay in research borders on depraved indifference. Speaking on behalf of only one heartbroken grandpa, I say the Food and Drug Administration, the National Institutes of Health, the U.S. Congress and the lawyers should get the hell out of the way and let these dedicated research scientists get on with their jobs.

If I were Erin's decision maker, would I enter her into a program with a serious potential for "adverse events"? Absolutely. I have lived a long enough life to aver that the quality of life is significantly more important than the quantity.

J. E. Murphy
Germantown, Tennessee

CAMEL TREKKING

ONE REASON THAT I ENJOYED DEREK Grzelewski's "It's Camelot in the Desert," your first Smithsonian Journeys article, was that the reference to the successful introduction of the camel to the Australian outback reminded me of the 19th-century experiment here in Texas. In 1853 U.S. Secretary of War Jefferson Davis began urging Congress to import camels to ferry supplies to far-flung forts in the Southwest. The $30,000 appropriation brought 75 camels to Texas in 1856 and 1857. While on a government wagon road survey in 1857, led by Edward Beale, the camels proved they could travel farther and faster than horses and mule-drawn wagons on little water and sparse vegetation. Alas, the Civil War broke out, ending the experiment.

William Bee
Austin, Texas

A BOOK WELL WORTH NOTING IS Robyn Davidson's *Tracks*, the account of the Queensland, Australia-born author's 1,700-mile journey across Australia with four camels and her dog, Diggity.

Sandra Bestland
Shoreview, Minnesota

ZORA NEALE HURSTON

I READ WITH PERSONAL INTEREST Marian Smith Holmes' article about Zora Neale Hurston. I knew Zora for a brief period in 1943 when she stayed at Barnard College, her alma mater, after receiving an unpleasant reception among her Harlem confreres.

Her opinions regarding segregation and many other subjects made for hot and heavy discussions. I remember one especial example. In late 1943 the U.S. Navy announced it would man the USS *Mason* and the *PC-1264* with white officers and all-black crews. Zora was ecstatic. "You watch. There will be a colored admiral soon. This is

GRANGER COLLECTION

the way my people will move forward, just as they have in education." She was right: in 1945 Samuel L. Gravely, Jr., served as an officer on the *PC-1264*, and in 1971 he became our first African-American admiral.

Zora was a Republican for good reason: she remembered Lincoln and her roots in freedom. And, of course, her father had been elected as a Republican mayor. She could not understand the slavish attitude of the New York "colored" to the Democratic Party, which was allied to the Southern oppressors. Zora did not buy the argument that the Northern party was a different breed from the Southern.

She was a great influence upon me. I watched her face down her opponents with reason, despite their threatening dialectics, and I never again accepted the prevailing belief. Like any maverick, you get used to being an outsider and take great comfort in it.

Alice Maxwell
Stuart, Florida

BOLLYWOOD

IN HIS ARTICLE "INSIDE BOLLYWOOD!" Lewis M. Simons correctly wrote about films being risky, about money not coming easily from institutional sources and about Bollywood's relationship with the underworld. While only a handful of producers have been using underworld sources for funds and other favors, the general impression certainly is that the film industry seems to be inextricably bound to organized crime syndicates.

There has recently been a change on this front, and less money for Bollywood films is coming from the underworld for two reasons. First, Bollywood is finding that when you take from the underworld, you have to give to them too. Because of the form and magnitude of what they want, and several murders and attempted murders over the past five years, producers are running scared of the underworld. Second, the central government has

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accorded "industry status" to the film industry, and of late, banks and other financial institutions are beginning to take it seriously. In the past few years, funds have begun to roll in from corporate financiers.

Anjum Rajabali
Mumbai, India

MIAMI LAND RUSH

I WAS SURPRISED THAT YOUR ARTICLE "The Madness That Swept Miami" didn't mention the Marx Brothers' first film, *The Cocoanuts* (1929). In it, Groucho plays the proprietor of Hotel de Cocoanut and tries to auction off worthless lots on the fictitious

In *The Cocoanuts*, Groucho Marx, left, mans the hotel's front desk while brothers Chico, center, and Harpo tussle with a bellhop.

Florida real estate development Cocoanut Manor, saying such things as, "Step this way for the big swindle . . . Florida, folks. Sunshine, sunshine. Perpetual sunshine all the year round. Let's get the auction started before we get a tornado." The movie, which gave us the immortal "viaduct"/"Why a duck?" routine, was filmed in the tropical verdure of Paramount's Astoria, New York, studio.

Roberta Saltzman
Astoria, New York

IN SPRING 1909, FOUR YEARS BEFORE he began developing Miami Beach, master promoter Carl Fisher and three other businessmen built a year-round testing track of crushed stone and tar for the state's burgeoning auto industry on 328 acres of central Indiana farmland. By August, they had replaced the original racing surface with 3.2 million paving bricks. In 1911 "The Brickyard" inaugurated the renowned annual 500-mile race, the Indianapolis 500.

Tom Prather
Indianapolis, Indiana

POINTS OF INTEREST

IN HIS ARTICLE ABOUT LONE PINE, California, Steve Kemper quotes a couple of lines from a bloody Tex Ritter ballad, then adds, "It ain't Cole Porter, but then again that tenderfoot probably couldn't rope a steer or shoot worth a dern."

Well, that may be so, but that dandy dude from Peru, Indiana, who wrote sophisticated songs such as "I've Got You Under My Skin" and "Anything Goes" also wrote the quintessential cowboy song, "Don't Fence Me In."

Jack J. Mass
New York, New York

ROGER EKIRCH

I ENJOYED JOYCE AND RICHARD Wolkomirs' article "When Bandogs Howle and Spirits Walk," about Roger Ekirch, historian of the night. Long before Capt. James Cook visited the Hawaiian Islands in 1778, extensive illuminated footpath systems existed here. In his diary, published as *The Journal of Reverend William Ellis*, the missionary refers to Hawaiians traveling at night. In 1823 Ellis circumnavigated the island of Hawaii by canoe. When his party pulled into Kiholo Bay on the Kona coast, he noted that many Hawaiians slept from sunset until the moon rose over Mauna Kea, and then began traveling.

Where a path crossed rough lava fields, the builders paved it with smooth, black lava stones and large, smooth, gray water-worn lava stones collected from beaches.

Early Hawaiians were possibly the first to use road reflectors. The road crews placed pieces of white coral, or limpet and cowrie sea shells between the black stones, at 2- to 3-foot intervals, which reflected the moonlight. On paths running from the ocean to the mountain, 3- to 5-foot-high black lava stone cairns delineated both paths and boundries.

Dave Lyman
Honolulu, Hawaii

SAMUEL JOHNSON'S "GREAT FRIEND and biographer" was James Boswell, not Samuel Pepys.

Delmar C. Homan
Lindsborg, Kansas

A NOTE FROM THE SECRETARY

NOT MENTIONED IN "A RARE BIRD," Secretary Lawrence M. Small's column about the Lockheed SR-71 Blackbird, is that when the Okinawans first saw the airplane, they thought it looked like their indigenous venomous *habu* snake and started calling it that. The nickname stuck, and the Blackbird "community" flying out of Okinawa—from pilots to the ground crew—call themselves HABUs.

Robert O. Noyer
Winchester, Virginia

WRITE TO SMITHSONIAN

Letters for consideration in this column must include your daytime telephone number, full name and postal address. Transmit mail to LettersEd@simag.si.edu or send it to Smithsonian Letters Editor, P.O. Box 44400, Washington, D.C. 20026-4400. Letters may be edited for clarity and length.

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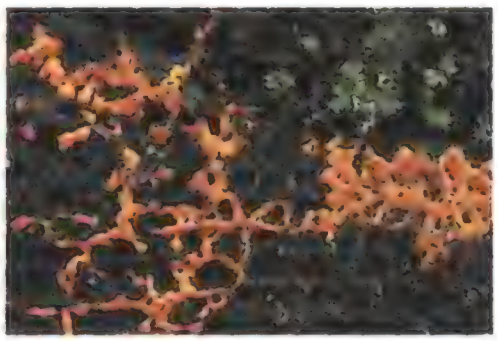
Hunting Slime Molds

THEY'RE NOT ANIMALS AND THEY'RE NOT PLANTS, AND BIOLOGISTS WANT TO KNOW A LOT MORE ABOUT THEM

BY ADELE CONOVER

WE ARE TRAVELING IN GREAT SMOKY MOUNTAINS National Park. Forest ecologist Steve Stephenson bends over a decaying stump and parts a curtain of moss so I can see a tiny stand of what looks like shimmering, miniature dark-blue soccer balls atop toothpick stalks. Earlier in their lives these "critters," as their taxonomists call them, slithered around as oatmeal-like globs—plasmodia—hunting bacteria with carnivore self-confidence. They are not animals, however. And despite their present puffball-like appearance, the navy-blue balls are not fungi, nor do their stalks attest to the sedentary life of a plant. These are slime molds, or myxomycetes (myxos), of the kingdom Protoctista, the least understood of the five kingdoms of life, the others being animals, plants, fungi and bacteria (SMITHSONIAN, July 1991). Slime molds are like nothing else on earth. In their plasmodium stage, they show a quality that could be called intelligence: chopped up and dropped into a labyrinth, they will put themselves back together and start to move, avoiding dead ends and heading unerringly for the prize—more food. Not surprisingly, they fascinate some biologists and amateur naturalists.



Slime molds at home (clockwise from top left): fruiting bodies are the size of a fingertip; new fruiting bodies sprout on a log; fruiting bodies grow on a fungus (white); and a slime mold in its very different plasmodium stage.

ALL: MARK CARROLL

I am here astraddle the North Carolina-Tennessee border on a spectacular Indian summer day with a team of myxo taxonomists participating in the All Taxa Biodiversity Inventory (ATBI), a 15-year effort to identify and catalog as many of the organisms occurring in the 808-square-mile park as possible. The myxo section is coordinated by Stephenson, who is also a biology professor at Fairmont State College in West Virginia. His fellow taxonomists on this expedition include British researcher David Mitchell; Ted Stampfer, a researcher from New Mexico and from Stephenson's West Virginia lab; visiting German scientist Martin Schnittler; and Stephenson's research associate, Randy Darrah.

The Smoky Mountains ATBI has been dubbed the biological equivalent of sending a man to the moon. In December 1997 dozens of taxonomists from some 25 universities and research institutions met in Gatlinburg, Tennessee, to launch the survey, set up a nonprofit overseer—Discover Life in America—and start raising funds. The National Park Service is providing housing, maps, vehicles and other support for the project. Scientists expect to uncover 100,000 species in the park, many new to science.

The taxonomy of myxos depends on what the fruiting bodies look like: size, shape, color and their "complexion" (smooth or warty), as well as microscopic characteristics detected back at a lab. They are found in rotting logs, stumps, bark and similar microhabitats on all continents.

A myxo begins life as a microscopic spore. After it's shaken out like a salt grain from its "parent" fruiting body, it germinates to produce a cell that in turn joins another of its fellows to form a zygote. The zygote devours bacteria found in decaying wood and elsewhere, increases its size by nuclear division, then masses into a blob called a plasmodium. The plasmodium—which can be clear, a preppy khaki, hot pink, or a flashy yellow, orange or red—acts like a giant amoeba, gorging on its prey of bacteria, spores and even other myxos until it runs out of food, whereupon it

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hikes off at about 1/25 of an inch per hour to a suitable location to sprout the fruiting bodies. The ideal spot is high enough to catch a passing breeze and dry enough to avoid fungi. Then the whole program repeats itself.

We clamber up the steep path to Clingmans Dome, at 6,643 feet the highest point in the park. Dozens of tourists march along with us, and for the most part, our band would pass without drawing undue attention. That is, until every so often a myxo team member brandishes his loupe, a magnifying glass slung from a cord about his neck, pulls out a small knife and plunges off the path into the bush.

In Hieronymus Bosch's Garden of Earthly Delights, one scientist found 22 slime molds.

Stephenson charges down a slope intent on a rotting log. Ted Stampfer scrabbles up to pore over a bush. Randy Darrah marches up to a still-standing tree and presses his loupe close to the bark. Englishman David Mitchell is examining a series of haggard-looking bushes. "Ah," he eventually says, smiling. Once again he has located the rare *Licea sambucina*, previously only seen in Europe and discovered here by Mitchell last year. It looks like a lilliputian orange. As this is such an uncommon find, every researcher goes for a bit of the bark. "It's like getting a piece of the Berlin Wall," notes Schnittler, who ought to know, having grown up on the eastern side of the wall.

Looking for myxos requires a practiced eye. Not until I have passed off a pinkish splotch as discarded bubble gum a number of times does someone point out it's a traveling slime mold plasmodium. "I don't know how many I have just passed by," laments Stephenson. Nevertheless, in some 25 years he has discovered at least a dozen new species.

We view tiny pinkish red "fruits," little golden balls, spotted leopardy-looking fruiting bodies and still others that look like minuscule hot dogs on a stick. On the first day of our trip we spot a yellow plasmodium sprawling on a log. To resolve a bet, we revisit the log the following day. Digital pictures taken by Darrah reveal that it has, in fact, moved. Under the skirts of leafy liverworts, Mitchell finds the smallest blueberry look-alike of the trip, *Barbeyella minutissima*. Along a fallen tree Stephenson points to a bump on a log. As we peer through our loupes, we watch helplessly as a pack of fuzzy insect larvae feast on the hapless fruiting bodies of *Hemitrichia calyculata*. This is the ice-cream-cone myxo, so called because in its fruiting stage it resembles a coffee ice-cream cone. "To the larvae, this is a nice thick milkshake," comments Stephenson.

Among the other enemies of slime molds are certain specialized beetles whose mandibles are modified into little scoops, all the better to shove creamy slime mold into their tiny gullets. For slime molds, the best defense against the elements and their enemies is a retreat. In really bad times, slime molds hunker down as hard little cystlike forms until better days arrive.

Apparently myxos have little impact on humans "for good or ill," notes Stephenson. For Mitchell, "their failure to have any discernible commercial value for humans" is why he studies them. Occasionally myxos get bad press in the gardening pages of newspapers, which advise treating creeping plasmodia with a gardener's equivalent to riot control: powerful streams of water from the hose. But others have appreciated these beautiful forms of life. The medieval artist Hieronymus Bosch, known for his fantastic paintings of Heaven and Hell, was also a meticulous painter of natural history. In his painting *Garden of Earthly Delights*, one scientist found representations of at least 22 species of slime molds.

Randy Darrah checks under a fallen tree, a favorite habitat for slime molds, in Great Smoky Mountains National Park.

There are two kinds of slime molds: the acellular, of which there are today 1,000 known species; and the cellular, of which about 70 species have been identified. The marked difference between them is that the acellular slime molds have many nuclei but only one cell wall during the plasmodial stage, while the cellular ones are composed of individual cells. In any case, slime molds, said to be a billion or so years old, could be one of the first organisms formed by independent cells joining together. Some are famous as lab "animals," like

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the cellular slime mold *Dictyostelium,* which has been figuring in genetics and uncovering the origins of complex organisms like ourselves, in whom many once independent cells gave up their separate identities.

To reach the spore state, the cellular slime molds start out as single cells that communicate by exuding certain chemicals, among them acrasin. This compound is a call for fellow cells to aggregate into a tiny slug, rather than a plasmodium, that then crawls around until it proceeds to stalkdom. Princeton professor John Bonner, who has been researching cellular slime molds for decades, named "acrasin" for the witch in Edmund Spenser's *Faerie Queene,* who lured men to her side and then transformed them into beasts.

Steve Stephenson holds a collecting bag while David Mitchell scrutinizes a blackberry cane, looking for their quarry.

The acellular may conquer mazes, but Bonner maintains that cellular slime molds are hardly slouches. "My beasts are not stupid," he insists. And apparently they are just as hell-bent on getting their slugs to a feeding ground of "bacteria . . . whereupon they sprout up into the air to be snagged by passing beasts . . . [mites, worms, etc.]." To do this they "center" themselves by exuding ammonia to prevent competition between individuals and to warn each other of the presence of an adjacent substrate such as a wall. Astutely they also orient themselves to the warmest spot in the soil whether it's night or day. "Remarkable feats for a bag of amoebas," notes Bonner.

We slog to the apex of Clingmans Dome and onto the Appalachian Trail. Climbing down the north slope some 600 feet, we are searching for Schnittler's new myxo species, *Lamproderma granulosum.* He has described it as having "the false but iridescent colors of the hummingbird." We are high enough to look down on the black backs of crows beating to windward over puffy clouds.

Schnittler first discovered this myxo in northern Germany and just this past year uncovered another patch here in the Smokies, on a similar rock face, an unusual habitat for eastern North America. For two such tiny myxos of the same rare species to exist some 5,000 miles apart seemed to me to hint of an ancient lineage. Their ancestors may have lived together on the supercontinent Pangea, been carried apart by plate tectonics, and been dispersed still farther on high-altitude winds.

When we reach the spot where the rock face had been, however, we find a landslide has toppled boulders, uprooted trees, spilled tons of dirt and wiped out what had been the myxo's microhabitat: a vertical slope, a seep of water and an overhang of moss.

Schnittler is not giving up. He and Darrah edge their way across a tree-strewn slope to different myxo pastures, and after rooting around woolly thickets of liverworts, they discover a close relative—*Lamproderma columbinum*—which, when magnified by the loupe, look like caviar set in a bed of ice.

Despite their beauty, these myxos are goners, as the "ice" is a fungus—a deadly enemy of myxos. Fungi insinuate their threads into myxo spores so that they can't reproduce, says Stephenson. In spite of the local fungi, however, he asserts that the Great Smokies ecosystem is thought to have more myxo species than even the tropical rain forests. "There the myxos are limited *because* of fungi," he adds.

The Great Smokies may have more myxo species than even the tropical rain forests.

At least one slime mold species does not take the ascent of fungi lying down. Their revenge is to eat the young. The slime mold *P. polycephalum* is a major fungus spore predator. Although we never see *P. polycephalum,* in an illustration of their lumpy-looking gray fruiting bodies in Stephenson's book *Myxomycetes: A Handbook of Slime Molds,* they appear almost thuggish—like a fist. Their plasmodia can also be impressive, perhaps resulting from their fungus-spore diet, notes Stephenson, who once saw one plasmodium that was nearly three yards wide. Slime molds are so different from us vertebrates that they might as well be aliens from other worlds. Yet they may help us understand our own bodies as great aggregations of once separate and independent organisms. If we think of ourselves as communes, we won't be far off.

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Brief Summary – see package insert for full prescribing information. **INDICATIONS AND USAGE** ARICEPT® is indicated for the treatment of mild to moderate dementia of the Alzheimer's type. **CONTRAINDICATIONS** ARICEPT® is contraindicated in patients with known hypersensitivity to donepezil hydrochloride or to piperidine derivatives. **WARNINGS** ***Anesthesia:*** ARICEPT®, as a cholinesterase inhibitor, is likely to exaggerate succinylcholine-type muscle relaxation during anesthesia. ***Cardiovascular Conditions:*** Because of their pharmacological action, cholinesterase inhibitors may have vagotonic effects on heart rate (e.g., bradycardia). The potential for this action may be particularly important to patients with "sick sinus syndrome" or other supraventricular cardiac conduction conditions. Syncopal episodes have been reported in association with the use of ARICEPT®. ***Gastrointestinal Conditions:*** Through their primary action, cholinesterase inhibitors may be expected to increase gastric acid secretion due to increased cholinergic activity. Therefore, patients should be monitored closely for symptoms of active or occult gastrointestinal bleeding, especially those at increased risk for developing ulcers, e.g., those with a history of ulcer disease or those receiving concurrent nonsteroidal anti-inflammatory drugs (NSAIDS). Clinical studies of ARICEPT® have shown no increase, relative to placebo, in the incidence of either peptic ulcer disease or gastrointestinal bleeding. ARICEPT®, as a predictable consequence of its pharmacological properties, has been shown to produce diarrhea, nausea and vomiting. These effects, when they occur, appear more frequently with the 10 mg/day dose than with the 5 mg/day dose. In most cases, these effects have been mild and transient, sometimes lasting one to three weeks, and have resolved during continued use of ARICEPT®. ***Genitourinary:*** Although not observed in clinical trials of ARICEPT® cholinomimetics may cause bladder outflow obstruction. ***Neurological Conditions:*** Seizures: Cholinomimetics are believed to have some potential to cause generalized convulsions. However, seizure activity also may be a manifestation of Alzheimer's Disease. ***Pulmonary Conditions:*** Because of their cholinomimetic actions, cholinesterase inhibitors should be prescribed with care to patients with a history of asthma or obstructive pulmonary disease. **PRECAUTIONS Drug-Drug Interactions** ***Drugs Highly Bound to Plasma Proteins:*** Drug displacement studies have been performed *in vitro* between this highly bound drug (96%) and other drugs such as furosemide, digoxin, and warfarin. ARICEPT® at concentrations of 0.3-10 µg/mL did not affect the binding of furosemide (5 µg/mL), digoxin (2 ng/mL), and warfarin (3 µg/mL) to human albumin. Similarly, the binding of ARICEPT® to human albumin was not affected by furosemide, digoxin, and warfarin. ***Effect of ARICEPT® on the Metabolism of Other Drugs:*** No *in vivo* clinical trials have investigated the effect of ARICEPT® on the clearance of drugs metabolized by CYP 3A4 (e.g. cisapride, terfenadine) or by CYP 2D6 (e.g. imipramine). However, *in vitro* studies show a low rate of binding to these enzymes (mean K_i about 50-130 µM), that, given the therapeutic plasma concentrations of donepezil (164 nM), indicates little likelihood of interference. Whether ARICEPT® has any potential for enzyme induction is not known. ***Effect of Other Drugs on the Metabolism of ARICEPT®:*** Ketoconazole and quinidine, inhibitors of CYP450, 3A4 and 2D6, respectively, inhibit donepezil metabolism *in vitro*. Whether there is a clinical effect of these inhibitors is not known. Inducers of CYP 2D6 and CYP 3A4 (e.g., phenytoin, carbamazepine, dexamethasone, rifampin, and phenobarbital) could increase the rate of elimination of ARICEPT®. ***Use with Anticholinergics:*** Because of their mechanism of action, cholinesterase inhibitors have the potential to interfere with the activity of anticholinergic medications. ***Use with Cholinomimetics and Other Cholinesterase Inhibitors:*** A synergistic effect may be expected when cholinesterase inhibitors are given concurrently with succinylcholine, similar neuromuscular blocking agents or cholinergic agonists such as bethanechol. **Carcinogenesis, Mutagenesis, Impairment of Fertility** Carcinogenicity studies of donepezil have not been completed. Donepezil was not mutagenic in the Ames reverse mutation assay in bacteria. In the chromosome aberration test in cultures of Chinese hamster lung (CHL) cells, some clastogenic effects were observed. Donepezil was not clastogenic in the *in vivo* mouse micronucleus test. Donepezil had no effect on fertility in rats at doses up to 10 mg/kg/day (approximately 8 times the maximum recommended human dose on a mg/m² basis). **Pregnancy** ***Pregnancy Category C:*** Teratology studies conducted in pregnant rats at doses up to 16 mg/kg/day (approximately 13 times the maximum recommended human dose on a mg/m² basis) and in pregnant rabbits at doses up to 10 mg/kg/day (approximately 16 times the maximum recommended human dose on a mg/m² basis) did not disclose any evidence for a teratogenic potential of donepezil. However, in a study in which pregnant rats were given up to 10 mg/kg/day (approximately 8 times the maximum recommended human dose on a mg/m² basis) from day 17 of gestation through day 20 postpartum, there was a slight increase in still births and a slight decrease in pup survival through day 4 postpartum at this dose; the next lower dose tested was 3 mg/kg/day. There are no adequate or well-controlled studies in pregnant women. ARICEPT® should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. **Nursing Mothers** It is not known whether donepezil is excreted in human breast milk. ARICEPT® has no indication for use in nursing mothers. **Pediatric Use** There are no adequate and well-controlled trials to document the safety and efficacy of ARICEPT® in any illness occurring in children. **ADVERSE REACTIONS Adverse Events Leading to Discontinuation** The rates of discontinuation from controlled clinical trials of ARICEPT® due to adverse events for the ARICEPT® 5 mg/day treatment groups were comparable to those of placebo-treatment groups at approximately 5%. The rate of discontinuation of patients who received 7-day escalations from 5 mg/day to 10 mg/day, was higher at 13%. The most common adverse events leading to discontinuation, defined as those occurring in at least 2% of patients and at twice the incidence seen in placebo patients, are shown in Table 1.

Table 1. Most Frequent Adverse Events Leading to Withdrawal from Controlled Clinical Trials by Dose Group

Dose Group	Placebo	5 mg/day ARICEPT®	10 mg/day ARICEPT®
Patients Randomized	355	350	315
Event/% Discontinuing			
Nausea	1%	1%	3%
Diarrhea	0%	<1%	3%
Vomiting	<1%	<1%	2%

Most Frequent Adverse Clinical Events Seen in Association with the Use of ARICEPT® The most common adverse events, defined as those occurring at a frequency of at least 5% in patients receiving 10 mg/day and twice the placebo rate, are largely predicted by ARICEPT®'s cholinomimetic effects. These include nausea, diarrhea, insomnia, vomiting, muscle cramp, fatigue and anorexia. These adverse events were often of mild intensity and transient, resolving during continued ARICEPT® treatment without the need for dose modification. There is evidence to suggest that the frequency of these common adverse events may be affected by the rate of titration. An open-label study was conducted with 269 patients who received placebo in the 15- and 30-week studies. These patients were titrated to a dose of 10 mg/day over a 6-week period. The rates of common adverse events were lower than those seen in patients titrated to 10 mg/day over one week in the controlled clinical trials and were comparable to those seen in patients on 5 mg/day. See Table 2 for a comparison of the most common adverse events following one and six week titration regimens.

Table 2. Comparison of Rates of Adverse Events in Patients Titrated to 10 mg/day Over 1 and 6 Weeks

	No titration		One-week titration	Six-week titration
Adverse Event	**Placebo (n=315)**	**5 mg/day (n=311)**	**10 mg/day (n=315)**	**10 mg/day (n=269)**
Nausea	6%	5%	19%	6%
Diarrhea	5%	8%	15%	9%
Insomnia	6%	6%	14%	6%
Fatigue	3%	4%	8%	3%
Vomiting	3%	3%	8%	5%
Muscle cramps	2%	6%	8%	3%
Anorexia	2%	3%	7%	3%

Adverse Events Reported in Controlled Trials The events cited reflect experience gained under closely monitored conditions of clinical trials in a highly selected patient population. In actual clinical practice or in other clinical trials, these frequency estimates may not apply, as the conditions of use, reporting behavior, and the kinds of patients treated may differ. Table 3 lists treatment emergent signs and symptoms that were reported in at least 2% of patients in placebo-controlled trials who received ARICEPT® and for which the rate of occurrence was greater for ARICEPT® assigned than placebo assigned patients. In general, adverse events occurred more frequently in female patients and with advancing age.

Table 3. Adverse Events Reported in Controlled Clinical Trials in at Least 2% of Patients Receiving ARICEPT® (donepezil HCl) and at a Higher Frequency than Placebo-treated Patients

Body System/Adverse Event	Placebo (n=355)	ARICEPT® (n=747)
Percent of Patients with any Adverse Event	**72**	**74**
Body as a Whole		
Headache	9	10
Pain, various locations	8	9
Accident	6	7
Fatigue	3	5
Cardiovascular System		
Syncope	1	2
Digestive System		
Nausea	6	11
Diarrhea	5	10
Vomiting	3	5
Anorexia	2	4
Hemic and Lymphatic System		
Ecchymosis	3	4
Metabolic and Nutritional System		
Weight Decrease	1	3
Musculoskeletal System		
Muscle Cramps	2	6
Arthritis	1	2
Nervous System		
Insomnia	6	9
Dizziness	6	8
Depression	<1	3
Abnormal Dreams	0	3
Somnolence	<1	2
Urogenital System		
Frequent Urination	1	2

Other Adverse Events Observed During Clinical Trials ARICEPT® has been administered to over 1700 individuals during clinical trials worldwide. Approximately 1200 of these patients have been treated for at least 3 months and more than 1000 patients have been treated for at least 6 months. Controlled and uncontrolled trials in the United States included approximately 900 patients. In regards to the highest dose of 10 mg/day, this population includes 650 patients treated for 3 months, 475 patients treated for 6 months and 116 patients treated for over 1 year. The range of patient exposure is from 1 to 1214 days. Treatment emergent signs and symptoms that occurred during 3 controlled clinical trials and two open-label trials in the United States were recorded as adverse events by the clinical investigators using terminology of their own choosing. To provide an overall estimate of the proportion of individuals having similar types of events, the events were grouped into a smaller number of standardized categories using a modified COSTART dictionary and event frequencies were calculated across all studies. These categories are used in the listing below. The frequencies represent the proportion of 900 patients from these trials who experienced that event while receiving ARICEPT®. All adverse events occurring at least twice are included, except for those already listed in Tables 2 or 3, COSTART terms too general to be informative, or events less likely to be drug caused. Events are classified by body system and listed using the following definitions: *frequent adverse events* — those occurring in at least 1/100 patients; *infrequent adverse events* — those occurring in 1/100 to 1/1000 patients. These adverse events are not necessarily related to ARICEPT® treatment and in most cases were observed at a similar frequency in placebo-treated patients in the controlled studies. No important additional adverse events were seen in studies conducted outside the United States. **Body as a Whole:** *Frequent:* influenza, chest pain, toothache; *Infrequent:* fever, edema face, periorbital edema, hernia hiatal, abscess, cellulitis, chills, generalized coldness, head fullness, listlessness. **Cardiovascular System:** *Frequent:* hypertension, vasodilation, atrial fibrillation, hot flashes, hypotension; *Infrequent:* angina pectoris, postural hypotension, myocardial infarction, AV block (first degree), congestive heart failure, arteritis, bradycardia, peripheral vascular disease, supraventricular tachycardia, deep vein thrombosis. **Digestive System:** *Frequent:* fecal incontinence, gastrointestinal bleeding, bloating, epigastric pain; *Infrequent:* eructation, gingivitis, increased appetite, flatulence, periodontal abscess, cholelithiasis, diverticulitis, drooling, dry mouth, fever sore, gastritis, irritable colon, tongue edema, epigastric distress, gastroenteritis, increased transaminases, hemorrhoids, ileus, increased thirst, jaundice, melena, polydipsia, duodenal ulcer, stomach ulcer. **Endocrine System:** *Infrequent:* diabetes mellitus, goiter. **Hemic and Lymphatic System:** *Infrequent:* anemia, thrombocythemia, thrombocytopenia, eosinophilia, erythrocytopenia. **Metabolic and Nutritional Disorders:** *Frequent:* dehydration; *Infrequent:* gout, hypokalemia, increased creatine kinase, hyperglycemia, weight increase, increased lactate dehydrogenase. **Musculoskeletal System:** *Frequent:* bone fracture; *Infrequent:* muscle weakness, muscle fasciculation. **Nervous System:** *Frequent:* delusions, tremor, irritability, paresthesia, aggression, vertigo, ataxia, increased libido, restlessness, abnormal crying, nervousness, aphasia; *Infrequent:* cerebrovascular accident, intracranial hemorrhage, transient ischemic attack, emotional lability, neuralgia, coldness (localized), muscle spasm, dysphoria, gait abnormality, hypertonia, hypokinesia, neurodermatitis, numbness (localized), paranoia, dysarthria, dysphasia, hostility, decreased libido, melancholia, emotional withdrawal, nystagmus, pacing. **Respiratory System:** *Frequent:* dyspnea, sore throat, bronchitis; *Infrequent:* epistaxis, post nasal drip, pneumonia, hyperventilation, pulmonary congestion, wheezing, hypoxia, pharyngitis, pleurisy, pulmonary collapse, sleep apnea, snoring. **Skin and Appendages:** *Frequent:* pruritus, diaphoresis, urticaria; *Infrequent:* dermatitis, erythema, skin discoloration, hyperkeratosis, alopecia, fungal dermatitis, herpes zoster, hirsutism, skin striae, night sweats, skin ulcer. **Special Senses:** *Frequent:* cataract, eye irritation, vision blurred; *Infrequent:* dry eyes, glaucoma, earache, tinnitus, blepharitis, decreased hearing, retinal hemorrhage, otitis externa, otitis media, bad taste, conjunctival hemorrhage, ear buzzing, motion sickness, spots before eyes. **Urogenital System:** *Frequent:* urinary incontinence, nocturia; *Infrequent:* dysuria, hematuria, urinary urgency, metrorrhagia, cystitis, enuresis, prostate hypertrophy, pyelonephritis, inability to empty bladder, breast fibroadenosis, fibrocystic breast, mastitis, pyuria, renal failure, vaginitis. **Postintroduction Reports** Voluntary reports of adverse events temporally associated with ARICEPT® that have been received since market introduction that are not listed above, and that there is inadequate data to determine the causal relationship with the drug include the following: abdominal pain, agitation, cholecystitis, confusion, convulsions, hallucinations, heart block (all types), hemolytic anemia, hepatitis, hyponatremia, pancreatitis, and rash. **OVERDOSAGE Because strategies for the management of overdose are continually evolving, it is advisable to contact a Poison Control Center to determine the latest recommendations for the management of an overdose of any drug.** As in any case of overdose, general supportive measures should be utilized. Overdosage with cholinesterase inhibitors can result in cholinergic crisis characterized by severe nausea, vomiting, salivation, sweating, bradycardia, hypotension, respiratory depression, collapse and convulsions. Increasing muscle weakness is a possibility and may result in death if respiratory muscles are involved. Tertiary anticholinergics such as atropine may be used as an antidote for ARICEPT® overdosage. Intravenous atropine sulfate titrated to effect is recommended: an initial dose of 1.0 to 2.0 mg IV with subsequent doses based upon clinical response. Atypical responses in blood pressure and heart rate have been reported with other cholinomimetics when co-administered with quaternary anticholinergics such as glycopyrrolate. It is not known whether ARICEPT® and/or its metabolites can be removed by dialysis (hemodialysis, peritoneal dialysis, or hemofiltration). Dose-related signs of toxicity in animals included reduced spontaneous movement, prone position, staggering gait, lacrimation, clonic convulsions, depressed respiration, salivation, miosis, tremors, fasciculation and lower body surface temperature.

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Eisai Inc.
Teaneck, NJ 07666

Pfizer U.S. Pharmaceuticals
New York, NY 10017

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Master of the Deep

BEFORE SMITHSONIAN SCIENTISTS DO UNDERWATER RESEARCH, MICHAEL LANG MAKES THEM SEAWORTHY

BY MICHAEL KERNAN

I WENT SCUBA DIVING ONCE IN Acapulco. Some locals with an old sailboat rented out the equipment and gave a "training course" in this potentially dangerous sport. There I was, sitting on the gunwale in mask, fins and tank; when it was time for the lesson, the instructor said: "If you get in trouble, get my attention and make like you're cutting your throat."

Well, about 25 feet down my mask began to press against my face, creating a vacuum that was popping my eyes out. Just before I panicked, I realized I was inhaling through my nose. I exhaled, and sure enough, the pressure equalized. I finished the dive unscathed, but I never did scuba again.

Now imagine the hundreds of marine biologists, archaeologists, geologists and botanists who work for the Smithsonian and need to get out of the office to do a little underwater fieldwork. It would not do to let these professorial types roam untutored in that beautiful but alien world.

Enter Michael Lang, the scientific diving officer for the entire Institution. Lang, a marine biologist himself, runs a rigorous entry-level science diving program for Smithsonian staff who have not been scuba diving before and need to do underwater research. He certifies about 180 scientists a year, many of whom are acquiring advanced underwater skills, such as the use of underwater cameras or learning to dive deeper for their research. There are at least 3,000 diving scientists across the country, according to the American Academy of Underwater Sciences.

Lang's basic three-week course

Not in his usual office attire, Michael Lang shows off some state-of-the-art scuba gear; the tanks and regulator on the left are 1950s vintage and no longer used.

JOSEPH M. EDDINS, JR.

At a sunken-ship site near Key Largo, Florida, about 100 feet under the ocean, Michael Lang, left, instructs three staff members from the Museum of Natural History.

includes safety procedures and the physics and physiology of diving, as well as actual instruction in diving. The Smithsonian trainees start out in a swimming pool, but before they are certified they will log 12 supervised ocean dives to qualify to work at a 30-foot depth. Divers can advance to depths of 60, 100, 130, 150 and, finally, 190 feet, which is the maximum depth for scientific diving.

"We're not talking about a ten-minute course," Lang said. "You compare it with what you get at many resorts, where they throw you off the back of the boat after a few hours in the pool. It shows in accident stats. We don't have any."

It's not only for safety; it's also a matter of time and money. "We want the scientists comfortable enough to jump into the water and focus on the science task," Lang said.

"We also did a safety study on how many dives per day, how many consecutive days you can dive," he added. Because every day at sea is expensive, divers try for three to four dives a day. When a human body goes deep underwater, it absorbs nitrogen. When a diver returns to the surface, he exhales the stored nitrogen through his lungs. The process is called off-gassing, and if done too rapidly, it can result in the painful bends, a condition in which nitrogen bubbles lodge in the joints and sometimes the brain or spinal column, where they may prove fatal. To avoid the bends, trained divers rise at just 30 feet per minute, pausing for three to five minutes at 15 to 20 feet before surfacing.

"In fact," Lang explained, "at 190 feet, you only have two or three minutes at that maximum depth. You then begin ascending, stopping every few minutes and collecting more data on the way up."

Most dives are less than 100 feet, and the majority are 60 feet or shallower. "A lot of our diving is coral reef work; and corals don't grow very deep because of their symbiotic relationship with algae that need sunlight," he said.

When research requires very deep dives, say 3,000 feet, as it did when the 3-D IMAX film *Galapagos* was produced for the Smithsonian two years ago, the descent is made in a submersible, which has a mechanical arm and suction tube for gathering specimens. Lang was on hand for the filming in the Galápagos Islands with a team of about 25 divers, for the more shallow work at about 130 feet.

One of the main problems, Lang said, was handling the huge and ungainly IMAX camera. In its aluminum casing, it resembles a mini-submarine. The camera unit weighed 1,200 pounds out of the water and required three divers to steady and operate it.

After 20 years as a scuba instructor, Lang is demanding, but he's also an expert at getting people through his course. He recalls only two or three dropouts over the years.

He spent 10 years at San Diego State University, where he was a staff biologist, before coming to the Smithsonian 11 years ago. He has dived most everywhere, including under the Antarctic ice to study krill and shrimp. He spends quite a bit of time on the research vessel *Urraca*, based at the Smithsonian Tropical Research Institute (STRI) in Panama. This 96-foot ship has a crew of five and a range of 3,000 miles. It can accommodate eight science divers at a time and is very practical for coastal oceanographic work.

"Two years ago we took it all the way out to Clipperton atoll, 600 miles west of Acapulco in the middle of the ocean, to study fish and corals."

Though his own specialty is biology, Lang spent two summers on an archaeological project in Lake Superior, assisting Paul Johnston, curator of maritime history at the National Museum of American History. They were exploring the wreck of the *Indiana*, one of the oldest propeller-driven steamboats in the Great Lakes.

"This was complex stuff," Lang said, "down 120 feet plus, where it's very cold. I had twin tanks, and I planned a series of decompression dives. We would drop the decompression bars in the water, and near the end of the dive—about 10 feet from the surface—we would hang there 14 minutes to off-gas before surfacing."

The Navy had already salvaged much material from the ship in 1978, but Johnston and his team took plots of the entire vessel and made measurements of its construction. The *Indiana*'s anchor, propeller and capstan are now on exhibit at the Museum of American History.

When he is not exploring the depths, Lang likes to snorkel with his three children, ages 12, 13 and 16. He's in no hurry, however, to teach them scuba. It is possible to get a junior scuba certificate at age 12, but the restrictions are severe. And diving safely requires a mature judgment.

At the very least, you've got to know to exhale before your eyes pop out.

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POINTS OF INTEREST

Clippety-clopping Along

THANKS TO SEVERAL DOZEN SUREFOOTED BEASTS OF BURDEN, TINY SUPAI, ARIZONA, GETS ITS MAIL EVERY WEEKDAY

BY STEVE KEMPER

Before he can deliver the mail, muleteer Charlie Chamberlain has to load it on one of his pack animals atop the Grand Canyon.

CHARLIE CHAMBERLAIN HAS BEEN DELIVERING THE mail to Supai, Arizona, for more than 20 years now, but he doesn't resemble your postman or mine. He wears spurs and chaps, and speeds up the pace of delivery with a strap and a sharp "Hee-yup!" He doesn't drive a white U.S. Postal Service van. He drives a mule train.

Mules began carrying mail to Supai, a village on the Havasupai Indian Reservation in a branch of the Grand Canyon, in 1896. The village is remote—eight miles from a trailhead parking lot that's 64 miles down a lonely road off Route 66. The only ways to reach Supai are by foot, horse or helicopter. Transport by helicopter is expensive, so nearly everything the villagers eat, use or want still arrives as mail on the backs of mules.

First, Supai's mail passes through the small post office in Peach Springs, 75 miles away. Tuesdays are hectic because that's when the big Shamrock Foods truck comes from Phoenix, stuffed with boxes for the village. By the time I get to the post office at 7:00 A.M., the Shamrock deliveryman has already unloaded 500 cases of soda, which Connie Olson has plastered with $2,600 worth of postage. It's expensive to get groceries by mail. "The

ALL: JASON MILLSTEIN

"You know that old adage about rain and snow and all that? Well, the mail does move out of here."

postage for the water costs more than the water itself," notes Olson, a cheerful woman who's been metering Supai's boxes for 14 years. She and Dawn Perez label each box with its destination—Café, Store, Lodge, Elderly Center—and then slap on a postage strip. "Lick 'em and stick 'em," says Olson.

After Olson and Perez finish labeling and metering, Larry Moore, a part-time helper and full-time local pastor, carts the boxes to a horse trailer latched onto a pickup truck. "Two hundred and sixty pieces today," he informs me, wheeling a load of pancake mix, garbage bags and pinto beans.

Hank Delaney pulls his pickup truck into a space behind the post office about 8:30, after collecting Supai's first-class mail at the post office in Kingman, 50 miles away. He's the contractor who's paid by the Postal Service to get the mail to Supai.

Postmaster Leroy Hurst walks in late after being dismissed from jury duty. "We've only missed delivery to Supai twice in the eight years I've been here," he tells me proudly. "You know that old adage about rain and snow and all that? Well, the mail *does* move out of here."

It takes Delaney more than an hour to haul the horse trailer full of mail to Hualapai Hilltop, on the lip of the canyon. The view here is spectacular, a symphony of rusty red rocks that soar in stratified layers above the desert, all of it topped by a deep blue sky. Hitching posts sprout from a patch of gravel where a sign says, "U.S. Mail Delivery Zone. Leave Clear At All Times." The sign must seem incongruous most of the time but makes perfect sense at the moment, with 75 mules and their packers gathered around it. As Delaney unloads the trailer, the muleteers begin tying boxes onto each side of their animals, looping ropes, adjusting cinches, talking softly in their native language. Almost all are Havasupai. They herded their mules up from the village earlier this morning, starting out about 8:00.

The Postal Service, through Delaney, is a major employer in Supai. He keeps 12 packers on his payroll but hires many more for each week's heaviest days. One recent delivery required 137 mules. "I figured out once that delivering this mail affects about 32 head-of-household incomes," he says.

Delaney's two lead wranglers are Charlie Chamberlain and David Jones. Over the years, they have taken television sets, computers, office furniture, even a 120-pound

The mule train negotiates a series of steep switchbacks on its way down then takes it easy on the trail at the bottom of Havasu Canyon.

box freezer into the canyon. During the holidays, the mail includes not only cards and presents but fresh-cut Christmas trees. "Generally," says Chamberlain, "if they can box it, we can pack it."

Jones, a Havasupai of few words, has been packing since 1984. When I ask what things are hardest to pack, he replies without hesitation: "Eggs!" Chamberlain mentions bread and potato chips, which turn to crumbs if packed incorrectly. The worst part of the job? "It gets *cold*," says Jones. Chamberlain adds heat, rain and ice to the list. In winter the mules wear shoes with cleats to grip the treacherous ice. "Sometimes in summer it gets to be 105 or 110 degrees," Chamberlain says, "so basically you're just cooking."

The seal above the mailbox at Supai's post office is the town's postmark, based on a basket design done by a local woman.

The mule train leaves in a loose group, going single file, each man riding a horse in front of his string of mules. Hooves clip-clop on the rocky ground, raising a fine dust. Mangy dogs trot behind. The descent into the canyon is steep, along sharp, short switchbacks. "You can have animals on three different levels at the same time," Chamberlain tells me, "and if you don't do it right, you can have a wreck."

He went more than 20 years without losing a mule, but his luck has changed lately. Barely five minutes from the hilltop, he shows me the spot where one of his animals ended up after getting kicked in the head and falling over the side. Farther along the trail, at a narrow switchback, he points to some white bones down the cliffside. "The mules got to shoving and jostling," he says, "and one of them got thrown over." A couple of miles later, on the floor of the canyon, we pass yet another heap of bones. "Mule just laid down and died," says Chamberlain. "Must have had a heart attack."

During the holidays, the mail includes not only cards and presents but fresh-cut Christmas trees.

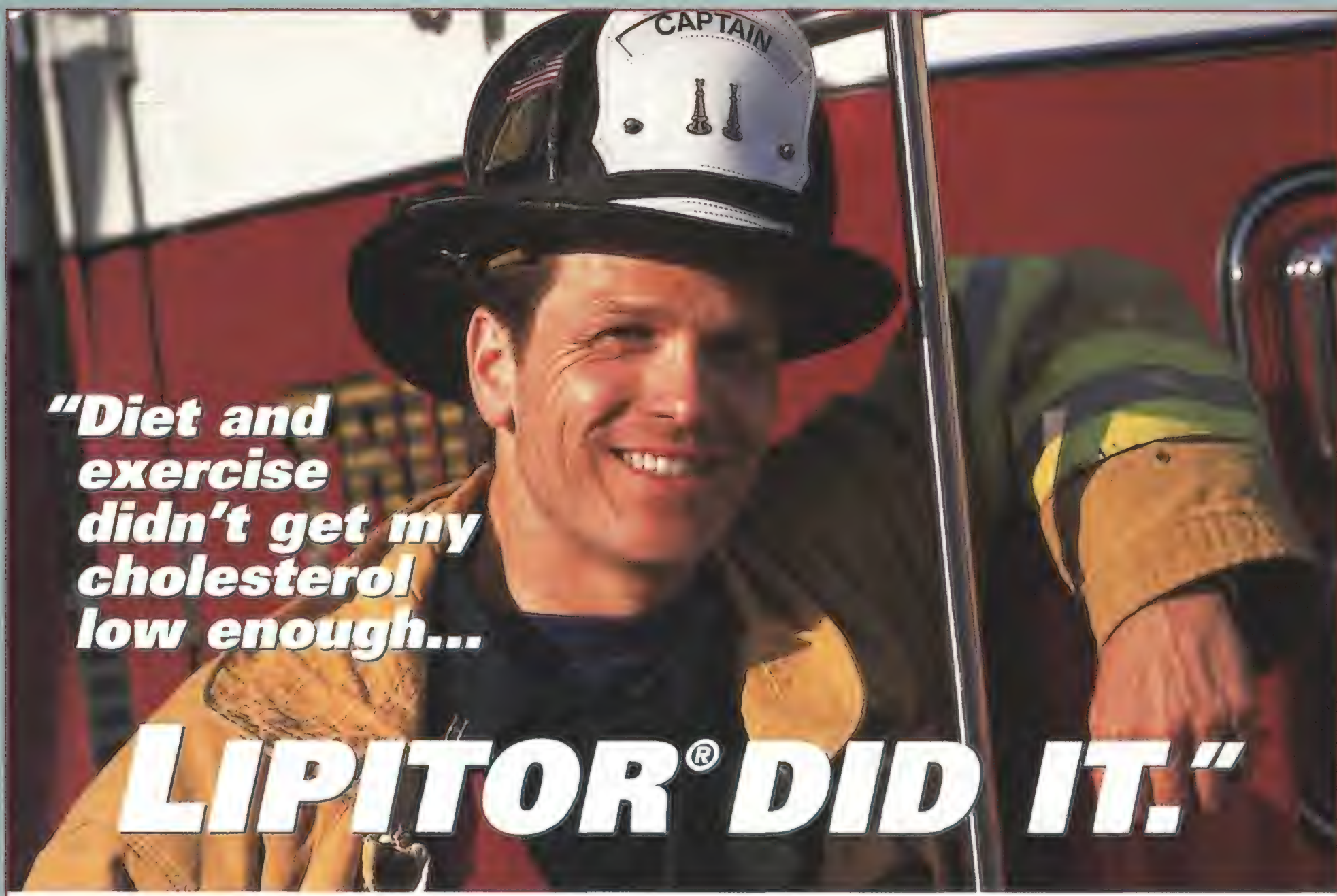
We ride through a sandy wash between high red walls. I'm starting to feel more than a little saddle sore, but on such a perfect day, it's hard to imagine a more beautiful delivery route. Chamberlain tells me about the flash floods that churn through here, how you can hear them coming by their roar and the boom-boom-*boom* of tumbling rocks. We pause beneath an overhang carved by rushing water, where Chamberlain once sheltered his string while waiting out a flood that almost got him.

After seven miles, Hualapai Canyon runs into Havasu Canyon. The landscape turns lush, watered by crystalline Havasu Creek, which Chamberlain has never seen dry. The creek is the reason the Havasupai began spending summers here centuries ago, in pre-postal days when they grew their own food.

As we approach the village, the trail becomes a sandy lane lined with huge old cottonwoods. Several hundred people live in this concentration of greenery nestled below lofty red walls. Downtown Supai consists of a café, a store, a clinic, a school and, of course, a tiny post office. The muleteers pile their boxes onto its concrete apron. Within an hour, the major recipients have hauled off their mail with wheelbarrows and carts. Inside, postmistress Shirley Manakaja sorts the regular mail into slots.

At the store, manager Desiree Putesoy is of two minds about Tuesdays. She needs the big delivery because her shelves are half empty, but it's also a lot of work to fill them back up. As usual, she was out of milk, fruit and eggs. Now she has 144 dozen eggs to unpack and must also deal with the rush of shoppers eager for fresh food. "They really crave it by Tuesday," she says.

Chamberlain and I go for a cold drink on the café's porch. I have a lemonade, he has a soda. He tells me how he loves his job and loves living in the village, where he and his Havasupai wife raised a family. His son, also a muleteer, comes over and hands Chamberlain his own mail: electric bill, phone bill, a reminder from his dentist. Supai's mule train may be a vestige of the past, but its cargo is strictly up-to-date, right down to that offer in Chamberlain's hand from a credit card company.



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Brief Summary of Prescribing Information

CONTRAINDICATIONS: Active liver disease or unexplained persistent elevations of serum transaminases. Hypersensitivity to any component of this medication. **Pregnancy and Lactation** — Atherosclerosis is a chronic process and discontinuation of lipid-lowering drugs during pregnancy should have little impact on the outcome of long-term therapy of primary hypercholesterolemia. Cholesterol and other products of cholesterol biosynthesis are essential components for fetal development (including synthesis of steroids and cell membranes). Since HMG-CoA reductase inhibitors decrease cholesterol synthesis and possibly the synthesis of other biologically active substances derived from cholesterol, they may cause fetal harm when administered to pregnant women. Therefore, HMG-CoA reductase inhibitors are contraindicated during pregnancy and in nursing mothers. ATORVASTATIN SHOULD BE ADMINISTERED TO WOMEN OF CHILDBEARING AGE ONLY WHEN SUCH PATIENTS ARE HIGHLY UNLIKELY TO CONCEIVE AND HAVE BEEN INFORMED OF THE POTENTIAL HAZARDS. If the patient becomes pregnant while taking this drug, therapy should be discontinued and the patient apprised of the potential hazard to the fetus.

WARNINGS: Liver Dysfunction — HMG-CoA reductase inhibitors, like some other lipid-lowering therapies, have been associated with biochemical abnormalities of liver function. **Persistent elevations (>3 times the upper limit of normal [ULN] occurring on 2 or more occasions) in serum transaminases occurred in 0.7% of patients who received atorvastatin in clinical trials. The incidence of these abnormalities was 0.2%, 0.2%, 0.6%, and 2.3% for 10, 20, 40, and 80 mg, respectively.** One patient in clinical trials developed jaundice. Increases in liver function tests (LFT) in other patients were not associated with jaundice or other clinical signs or symptoms. Upon dose reduction, drug interruption, or discontinuation, transaminase levels returned to or near pretreatment levels without sequelae. Eighteen of 30 patients with persistent LFT elevations continued treatment with a reduced dose of atorvastatin. **It is recommended that liver function tests be performed prior to and at 12 weeks following both the initiation of therapy and any elevation of dose, and periodically (eg, semiannually) thereafter.** Liver enzyme changes generally occur in the first 3 months of treatment with atorvastatin. Patients who develop increased transaminase levels should be monitored until the abnormalities resolve. Should an increase in ALT or AST of >3 times ULN persist, reduction of dose or withdrawal of atorvastatin is recommended. Atorvastatin should be used with caution in patients who consume substantial quantities of alcohol and/or have a history of liver disease. Active liver disease or unexplained persistent transaminase elevations are contraindications to the use of atorvastatin (see CONTRAINDICATIONS). **Skeletal Muscle — Rhabdomyolysis with acute renal failure secondary to myoglobinuria has been reported with other drugs in this class.** Uncomplicated myalgia has been reported in atorvastatin-treated patients (see ADVERSE REACTIONS). Myopathy, defined as muscle aches or muscle weakness in conjunction with increases in creatine phosphokinase (CPK) values >10 times ULN, should be considered in any patient with diffuse myalgias, muscle tenderness or weakness, and/or marked elevation of CPK. Patients should be advised to report promptly unexplained muscle pain, tenderness or weakness, particularly if accompanied by malaise or fever. Atorvastatin therapy should be discontinued if markedly elevated CPK levels occur or myopathy is diagnosed or suspected. The risk of myopathy during treatment with other drugs in this class is increased with concurrent administration of cyclosporine, fibric acid derivatives, erythromycin, niacin, or azole antifungals. Physicians considering combined therapy with atorvastatin and fibric acid derivatives, erythromycin, immunosuppressive drugs, azole antifungals, or lipid-lowering doses of niacin should carefully weigh the potential benefits and risks and should carefully monitor patients for any signs or symptoms of muscle pain, tenderness, or weakness, particularly during the initial months of therapy and during any periods of upward dosage titration of either drug. Periodic creatine phosphokinase (CPK) determinations may be considered in such situations, but there is no assurance that such monitoring will prevent the occurrence of severe myopathy. **Atorvastatin therapy should be temporarily withheld or discontinued in any patient with an acute, serious condition suggestive of a myopathy or having a risk factor predisposing to the development of renal failure secondary to rhabdomyolysis (eg, severe acute infection, hypotension, major surgery, trauma, severe metabolic, endocrine and electrolyte disorders, and uncontrolled seizures).**

PRECAUTIONS: General — Before instituting therapy with atorvastatin, an attempt should be made to control hypercholesterolemia with appropriate diet, exercise, and weight reduction in obese patients, and to treat other underlying medical problems (see INDICATIONS AND USAGE in full prescribing information). **Information for Patients** — Patients should be advised to report promptly unexplained muscle pain, tenderness, or weakness, particularly if accompanied by malaise or fever. **Drug Interactions** — The risk of myopathy during treatment with other drugs of this class is increased with concurrent administration of cyclosporine, fibric acid derivatives, niacin (nicotinic acid), erythromycin, azole antifungals (see WARNINGS, Skeletal Muscle). ***Antacid:*** When atorvastatin and Maalox® TC suspension were coadministered, plasma concentrations of atorvastatin decreased approximately 35%. However, LDL-C reduction was not altered. ***Antipyrine:*** Because atorvastatin does not affect the pharmacokinetics of antipyrine, interactions with other drugs metabolized via the same cytochrome isozymes are not expected. ***Colestipol:*** Plasma concentrations of atorvastatin decreased approximately 25% when colestipol and atorvastatin were coadministered. However, LDL-C reduction was greater when atorvastatin and colestipol were coadministered than when either drug was given alone. ***Cimetidine:*** Atorvastatin plasma concentrations and LDL-C reduction were not altered by coadministration of cimetidine. ***Digoxin:*** When multiple doses of atorvastatin and digoxin were coadministered, steady-state plasma digoxin concentrations increased by approximately 20%. Patients taking digoxin should be monitored appropriately. ***Erythromycin:*** In healthy individuals, plasma concentrations of atorvastatin increased approximately 40% with coadministration of atorvastatin and erythromycin, a known inhibitor of cytochrome P450 3A4 (see WARNINGS, Skeletal Muscle). ***Oral Contraceptives:*** Coadministration of atorvastatin and an oral contraceptive increased AUC values for norethindrone and ethinyl estradiol by approximately 30% and 20%. These increases should be considered when selecting an oral contraceptive for a woman taking atorvastatin. ***Warfarin:*** Atorvastatin had no clinically significant effect on prothrombin time when administered to patients receiving chronic warfarin treatment. **Endocrine Function** — HMG-CoA reductase inhibitors interfere with cholesterol synthesis and theoretically might blunt adrenal and/or gonadal steroid production. Clinical studies have shown that atorvastatin does not reduce basal plasma cortisol concentration or impair adrenal reserve. The effects of HMG-CoA reductase inhibitors on male fertility have not been studied in adequate numbers of patients. The effects, if any, on the pituitary-gonadal axis in premenopausal women are unknown. Caution should be exercised if an HMG-CoA reductase inhibitor is administered concomitantly with drugs that may decrease the levels or activity of endogenous steroid hormones, such as ketoconazole, spironolactone, and cimetidine. **CNS Toxicity** — Brain hemorrhage was seen in a female dog treated for 3 months at 120 mg/kg/day. Brain hemorrhage and optic nerve vacuolation were seen in another female dog that was sacrificed in moribund condition after 11 weeks of escalating doses up to 280 mg/kg/day. The 120 mg/kg dose resulted in a systemic exposure approximately 16 times the human plasma area-under-the-curve (AUC, 0-24 hours) based on the maximum human dose of 80 mg/day. A single tonic convulsion was seen in each of 2 male dogs (one treated at 10 mg/kg/day and one at 120 mg/kg/day) in a 2-year study. No CNS lesions have been observed in mice after chronic treatment for up to 2 years at doses up to 400 mg/kg/day or in rats at doses up to 100 mg/kg/day. These doses were 6 to 11 times (mouse) and 8 to 16 times (rat) the human AUC (0-24) based on the maximum recommended human dose of 80 mg/day. CNS vascular lesions, characterized by perivascular hemorrhages, edema, and mononuclear cell infiltration of perivascular spaces, have been observed in dogs treated with other members of this class. A chemically similar drug in this class produced optic nerve degeneration (Wallerian degeneration of retinogeniculate fibers) in clinically normal dogs in a dose-dependent fashion at a dose that produced plasma drug levels about 30 times higher than the mean drug level in humans taking the highest recommended dose. **Carcinogenesis, Mutagenesis, Impairment of Fertility** — In a 2-year carcinogenicity study in rats at dose levels of 10, 30, and 100 mg/kg/day, 2 rare tumors were found in muscle in high-dose females: in one, there was a rhabdomyosarcoma and, in another, there was a fibrosarcoma. This dose represents a plasma AUC (0-24) value of approximately 16 times the mean human plasma drug exposure after an 80 mg oral dose. A 2-year carcinogenicity study in mice given 100, 200, or 400 mg/kg/day resulted in a significant increase in liver adenomas in high-dose males and liver carcinomas in high-dose females. These findings occurred at plasma AUC (0-24) values of approximately 6 times the mean human plasma drug exposure after an 80 mg oral dose. *In vitro*, atorvastatin was not mutagenic or clastogenic in the following tests with and without metabolic activation: the Ames test with *Salmonella typhimurium* and *Escherichia coli*, the HGPRT forward mutation assay in Chinese hamster lung cells, and the chromosomal aberration assay in Chinese hamster lung cells. Atorvastatin was negative in the *in vivo* mouse micronucleus test. Studies in rats performed at doses up to 175 mg/kg (15 times the human exposure) produced no changes in fertility. There was aplasia and aspermia in the epididymis of 2 of 10 rats treated with 100 mg/kg/day of atorvastatin for 3 months (16 times the human AUC at the 80 mg dose); testis weights were significantly lower at 30 and 100 mg/kg and epididymal weight was lower at 100 mg/kg. Male rats given 100 mg/kg/day for 11 weeks prior to mating had decreased sperm motility, spermatid head concentration, and increased abnormal sperm. Atorvastatin caused no adverse effects on semen parameters, or reproductive organ histopathology in dogs given doses of 10, 40, or 120 mg/kg for two years. **Pregnancy — Pregnancy Category X: See CONTRAINDICATIONS.** Safety in pregnant women has not been established. Atorvastatin crosses the rat placenta and reaches a level in fetal liver equivalent to that of maternal plasma. Atorvastatin was not teratogenic in rats at doses up to 300 mg/kg/day or in rabbits at doses up to 100 mg/kg/day. These doses resulted in multiples of about 30 times (rat) or 20 times (rabbit) the human exposure based on surface area (mg/m^2). In a study in rats given 20, 100, or 225 mg/kg/day, from gestation day 7 through to lactation day 21 (weaning), there was decreased pup survival at birth, neonate, weaning, and maturity in pups of mothers dosed with 225 mg/kg/day. Body weight was decreased on days 4 and 21 in pups of mothers dosed at 100 mg/kg/day; pup body weight was decreased at birth and at days 4, 21, and 91 at 225 mg/kg/day. Pup development was delayed (rotorod performance at 100 mg/kg/day and acoustic startle at 225 mg/kg/day; pinnae detachment and eye opening at 225 mg/kg/day). These doses correspond to 6 times (100 mg/kg) and 22 times (225 mg/kg) the human AUC at 80 mg/day. Rare reports of congenital anomalies have been received following intrauterine exposure to HMG-CoA reductase inhibitors. There has been one report of severe congenital bony deformity, tracheo-esophageal fistula, and anal atresia (VATER association) in a baby born to a woman who took lovastatin with dextroamphetamine sulfate during the first trimester of pregnancy. LIPITOR should be administered to women of child-bearing potential only when such patients are highly unlikely to conceive and have been informed of the potential hazards. If the woman becomes pregnant while taking LIPITOR, it should be discontinued and the patient advised again as to the potential hazards to the fetus. **Nursing Mothers** — Nursing rat pups had plasma and liver drug levels of 50% and 40%, respectively, of that in their mother's milk. Because of the potential for adverse reactions in nursing infants, women taking LIPITOR should not breast-feed (see CONTRAINDICATIONS). **Pediatric Use** — Treatment experience in a pediatric population is limited to doses of LIPITOR up to 80 mg/day for 1 year in 8 patients with homozygous FH. No clinical or biochemical abnormalities were reported in these patients. None of these patients was below 9 years of age. **Geriatric Use** — Treatment experience in adults age ≥70 years with doses of LIPITOR up to 80 mg/day has been evaluated in 221 patients. The safety and efficacy of LIPITOR in this population were similar to those of patients <70 years of age.

ADVERSE REACTIONS: LIPITOR is generally well-tolerated. Adverse reactions have usually been mild and transient. In controlled clinical studies of 2502 patients, <2% of patients were discontinued due to adverse experiences attributable to atorvastatin. The most frequent adverse events thought to be related to atorvastatin were constipation, flatulence, dyspepsia, and abdominal pain. **Clinical Adverse Experiences** — Adverse experiences reported in ≥2% of patients in placebo-controlled clinical studies of atorvastatin, regardless of causality assessment, are shown in the following table.

Adverse Events in Placebo-Controlled Studies (% of Patients)

BODY SYSTEM Adverse Event	Placebo N = 270	Atorvastatin 10 mg N = 863	Atorvastatin 20 mg N = 36	Atorvastatin 40 mg N = 79	Atorvastatin 80 mg N = 94
BODY AS A WHOLE					
Infection	10.0	10.3	2.8	10.1	7.4
Headache	7.0	5.4	16.7	2.5	6.4
Accidental Injury	3.7	4.2	0.0	1.3	3.2
Flu Syndrome	1.9	2.2	0.0	2.5	3.2
Abdominal Pain	0.7	2.8	0.0	3.8	2.1
Back Pain	3.0	2.8	0.0	3.8	1.1
Allergic Reaction	2.6	0.9	2.8	1.3	0.0
Asthenia	1.9	2.2	0.0	3.8	0.0
DIGESTIVE SYSTEM					
Constipation	1.8	2.1	0.0	2.5	1.1
Diarrhea	1.5	2.7	0.0	3.8	5.3
Dyspepsia	4.1	2.3	2.8	1.3	2.1
Flatulence	3.3	2.1	2.8	1.3	1.1
RESPIRATORY SYSTEM					
Sinusitis	2.6	2.8	0.0	2.5	6.4
Pharyngitis	1.5	2.5	0.0	1.3	2.1
SKIN AND APPENDAGES					
Rash	0.7	3.9	2.8	3.8	1.1
MUSCULOSKELETAL SYSTEM					
Arthralgia	1.5	2.0	0.0	5.1	0.0
Myalgia	1.1	3.2	5.6	1.3	0.0

The following adverse events were reported, regardless of causality assessment in patients treated with atorvastatin in clinical trials. The events in italics occurred in ≥2% of patients and the events in plain type occurred in <2% of patients.

Body as a Whole: *Chest pain*, face edema, fever, neck rigidity, malaise, photosensitivity reaction, generalized edema. ***Digestive System:*** *Nausea*, gastroenteritis, liver function tests abnormal, colitis, vomiting, gastritis, dry mouth, rectal hemorrhage, esophagitis, eructation, glossitis, mouth ulceration, anorexia, increased appetite, stomatitis, biliary pain, cheilitis, duodenal ulcer, dysphagia, enteritis, melena, gum hemorrhage, stomach ulcer, tenesmus, ulcerative stomatitis, hepatitis, pancreatitis, cholestatic jaundice. ***Respiratory System:*** *Bronchitis, rhinitis*, pneumonia, dyspnea, asthma, epistaxis. ***Nervous System:*** *Insomnia, dizziness*, paresthesia, somnolence, amnesia, abnormal dreams, libido decreased, emotional lability, incoordination, peripheral neuropathy, torticollis, facial paralysis, hyperkinesia, depression, hypesthesia, hypertonia. ***Musculoskeletal System:*** *Arthritis*, leg cramps, bursitis, tenosynovitis, myasthenia, tendinous contracture, myositis. ***Skin and Appendages:*** Pruritus, contact dermatitis, alopecia, dry skin, sweating, acne, urticaria, eczema, seborrhea, skin ulcer. ***Urogenital System:*** *Urinary tract infection*, urinary frequency, cystitis, hematuria, impotence, dysuria, kidney calculus, nocturia, epididymitis, fibrocystic breast, vaginal hemorrhage, albuminuria, breast enlargement, metrorrhagia, nephritis, urinary incontinence, urinary retention, urinary urgency, abnormal ejaculation, uterine hemorrhage. ***Special Senses:*** Amblyopia, tinnitus, dry eyes, refraction disorder, eye hemorrhage, deafness, glaucoma, parosmia, taste loss, taste perversion. ***Cardiovascular System:*** Palpitation, vasodilatation, syncope, migraine, postural hypotension, phlebitis, arrhythmia, angina pectoris, hypertension. ***Metabolic and Nutritional Disorders:*** *Peripheral edema*, hyperglycemia, creatine phosphokinase increased, gout, weight gain, hypoglycemia. ***Hemic and Lymphatic System:*** Ecchymosis, anemia, lymphadenopathy, thrombocytopenia, petechia. ***Postintroduction Reports*** — Adverse events associated with LIPITOR therapy reported since market introduction, that are not listed above, regardless of causality assessment, include the following: anaphylaxis, angioneurotic edema, bullous rashes (including erythema multiforme, Stevens-Johnson syndrome, and toxic epidermal necrolysis), and rhabdomyolysis.

OVERDOSAGE: There is no specific treatment for atorvastatin overdosage. In the event of an overdose, the patient should be treated symptomatically, and supportive measures instituted as required. Due to extensive drug binding to plasma proteins, hemodialysis is not expected to significantly enhance atorvastatin clearance.

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Creations in Clay

SMITHSONIAN HIGHLIGHTS

"SOME PEOPLE WORK AND WORK TO REFINE one idea," says ceramic artist Patti Warashina. "My stuff is more like a camera snapshot—the whole world is out there, so why do it twice?" Her "Convertible Car Kiln," c. 1971, portrays a sporty automobile as a resplendent brick furnace from which tendrils of fire blaze skyward, instantly transforming the images of car and kiln into a stunning new vision.

"Convertible Car Kiln" is part of the *USA Clay* exhibition featured at the Renwick Gallery of the Smithsonian American Art Museum, March 9 through July 15, 2001. Ninety-two pieces of ceramics, ranging from functional wares to folk art to conceptual sculptures, emphasize many of the techniques artists use to manipulate and interpret clay. Some of the pieces reflect the rich ceramic heritage of Japan, displaying classic Japanese *tenmoku* (black and brown) glazes and superb mastery of form. Others utilize the kinds of vibrant colors and exuberant imagery typically identified with the majolica tradition of Italy. Some artists are more interested in function, depicting food and drink with their pieces and creating tableware intended for use, such as porcelain teapots and uniquely styled plates.

For Warashina, functional pottery quickly gave way to hand-built shapes. Instead of using the earth colors of the ceramic style popular at the time, she used low-fire glazes and even applied acrylic paints to create brightly colored surfaces. Her "Convertible Car Kiln," a ceramic over a wood base, boasts plastic windows, fabric seats and glazes topped with gold and silver metallic finishes. Warashina also infuses the work with the kind of youthful vitality and playfulness that helped establish the characteristics for which she has become known—meticulous craftsmanship teamed with witty concepts. —*Lucinda Moore*

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SMITHSONIAN

HIGHLIGHTS

Aluminum by Design: Jewelry to Jets

COOPER-HEWITT, NATIONAL DESIGN MUSEUM

[NEW YORK CITY]

The exhibition, opening March 20, traces the history of aluminum from its first appearance as fine jewelry to its use in mass-produced objects to its role as the essential element in aeronautical, automotive and industrial design.

Aluminum profoundly influenced design in the 20th century, and because of its wide range of uses and its affordability, it significantly changed society as well. Its impact on transportation was no less than revolutionary. The dramatic changes that took place in aviation between World Wars I and II would have been impossible without aluminum. New alloys were added to the metal to increase its hardness and strength, which led to its widespread use not only in airplane construction but also in the creation of high-speed trains and racing cars.

Although it is the most abundant metal in the earth's crust, aluminum, initially, was difficult to come by. In fact, it was at one time considered precious enough to be made into jewelry for royalty. But discoveries by 19th-century scientists led to commercially viable methods of extracting the metal, and producers began working feverishly to demonstrate its many potential uses.

Organized by the Carnegie Museum of Art in Pittsburgh, this show is the first major traveling museum exhibition on aluminum. After it leaves the Cooper-Hewitt, National Design Museum on July 15, it will travel to Montreal, Canada; Miami, Florida; Bloomfield Hills, Michigan; and London, England.

From aluminum tableware to architecture, from horseless carriages to high-tech furniture, from minimalist sculpture to fashion trends, such as the aluminum minidress (opposite), the exhibition explores the many faces of this ubiquitous metal, revealing how aluminum has taken us from bicycles to skyscrapers and through the sound barrier.

P. 44 BRUCE MILLER/M. PATRICIA WARASHINA

L O N G

Four-legged Variety

The longhorn is a native Texan.

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INSTITUT POUR L'HISTOIRE DE L'ALUMINUM COLLECTION, PARIS

Paco Rabanne, who created a minidress made of aluminum plaques in 1969, still uses the metal in his couture collections.

Smithsonian Website

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At the Magazine's homepage, click on "Events" to go to the calendar and view on-line versions of Smithsonian exhibitions and activities.

Exhibitions and Events

NATIONAL MUSEUM OF AFRICAN ART

Encounters with the Contemporary (through January 6, 2002) Works by 32 important African modernists reflect the strength of contemporary art in Africa and its diaspora. The exhibition features a diverse range of media, including prints, paintings, sculpture, digital photographs and mixed media. The museum will also feature lectures and other related events. Call 202-357-4600, ext. 222, for information.

ARTS AND INDUSTRIES BUILDING

When the Spirit Moves: African American Dance in History and Art (through June 1) Historical artifacts and works of art show how key characteristics of African dance have come to influence American dance.

Santos: Substance & Soul (through March 31) The show features some 40 Latin American devotional santos. It is organized by the Smithsonian Center for Materials Research and Education in an effort to explain the science of museum conservation.

NATIONAL AIR AND SPACE MUSEUM

Pioneers of Flight and *Milestones of Flight* are closed for renovation through July. The Wright brothers' *Flyer*, the *Spirit of St. Louis*, the *Viking Lander* and the moon rock will, however, remain on view.

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NATIONAL MUSEUM OF AMERICAN HISTORY

The Underwater Web: Cabling the Seas (March 23 through March 2002) The exhibition explores the era when telegraph cable was laid beneath the ocean in the 19th century to electronically connect first Britain and France, then America and Europe. Presented in the Smithsonian Institution Libraries Exhibition Gallery.
The American Presidency: A Glorious Burden (new permanent exhibition) Nearly 1,000 objects associated with the nation's highest office. Tickets are required; for more information, call 202-786-2122.
Fast Attacks and Boomers: Submarines in the Cold War (through April 2003) Graphics and interactives tell about the role these vessels played in American policy during this period.

NATIONAL MUSEUM OF NATURAL HISTORY

Listening to the Prairie: Farming in Nature's Image (through March 31) An interactive display connects products to the prairie.

HIRSHHORN MUSEUM AND SCULPTURE GARDEN

William Kentridge (through May 13) An artist's take on the recent troubled history of South Africa is revealed in this exhibition of short animated films and 60 charcoal drawings.
Directions—Tim Hawkinson (March 15 through July 1) Constructions and drawings by the Los Angeles artist are distinguished by his use of cast-off materials, quirky mechanics and deadpan humor.

ARTHUR M. SACKLER GALLERY

Persepolis: Documenting an Ancient Iranian Capital, 1923-1935 (through May 6) Archaeological materials, drawings and photographs from the excavation of the Persian city.
India Through the Lens: Photography 1840-1911 (through March 25) Rich images of India's architecture, landscape and people.

FREER GALLERY OF ART

Real and Imagined Places in Japanese Art (March 4 through October 21) Japanese paintings, ceramics and lacquer works present views of real and imagined places. Real places rendered in paintings include the city of Edo and Mount Fuji in Japan. Scenes from Japanese legend and literature as well as places described in sacred Buddhist texts are presented in works dating from the 12th to the 19th century.
Storage Jars of Asia (through March 10, 2002) Large jars made between the 8th century B.C. and the 18th century.

GEORGE GUSTAV HEYE CENTER, NATIONAL MUSEUM OF THE AMERICAN INDIAN [NEW YORK CITY]

Beauty, Honor, and Tradition: The Legacy of Plains Indian Shirts (through November 4) Insight into the symbolic meaning of 49 exquisitely crafted shirts painted and adorned with beads, porcupine quills and ribbon.
Gifts of Pride and Love: Kiowa and Comanche Cradles (March 4 through May 27) Cradles showcase Plains Indian bead design of the late 19th and the 20th centuries.

NATIONAL ZOOLOGICAL PARK

The Giant Pandas (new permanent exhibition) The Zoo's new giant pandas, Mei Xiang and Tian Tian, are now entertaining visitors after their much-anticipated arrival from China on December 6. To view live video of the pandas, go to pandas.si.edu.
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NATIONAL POSTAL MUSEUM

Columbus' Voyage of Discovery: The Columbian Series of 1893 (March 8 through June 1) Showcases a complete set of 1893 Columbian Exposition sheet stamps, the first commemorative stamps issued by the Post Office Department. *Presidential Mail: On Official Business* (through March 26) The exhibition explores the history of the Presidential franking privilege.

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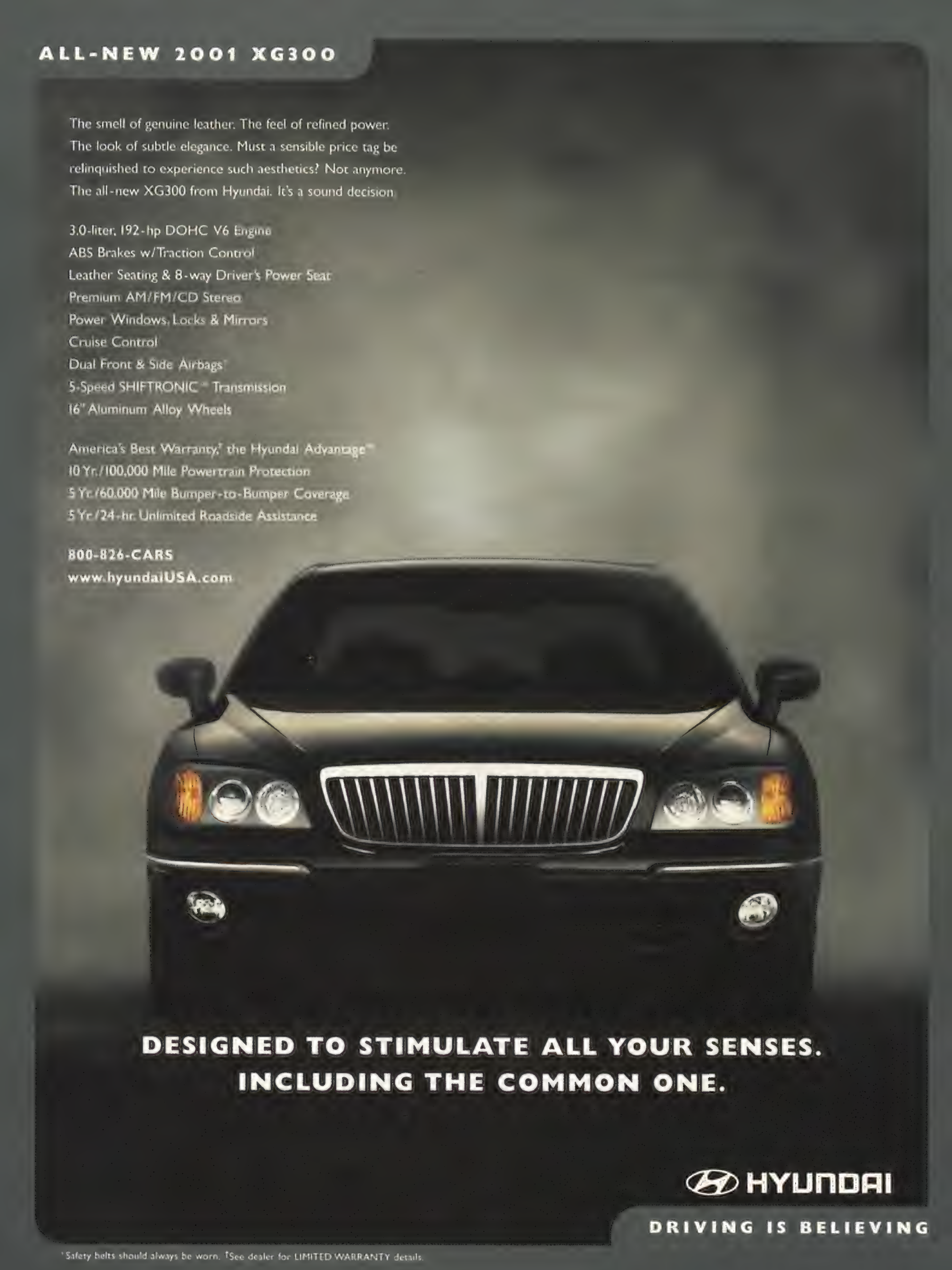

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THE SUBMARINE THAT COULD

RUN SILENT, RUN DEEP

BY THOMAS B. ALLEN

ILLUSTRATIONS BY PETER M. FIORE

The sonar room supervisor of the nuclear-powered fast-attack submarine USS *Batfish* (SSN 681) picked up his microphone and punched the intercom button for the officer of the deck a few feet away in the control room. "CONN, SONAR. SONAR CONTACT BEARING ZERO-SIX-TWO. CLASSIFIED POSSIBLE SOVIET SUBMARINE!" The sonar had just picked up the distinctive sounds of a Soviet ballistic missile submarine on a course toward the East Coast of the United States.

The USS *Batfish* (foreground) picked up the sound trail of a Soviet ballistic missile submarine as the big "boomer" left the Barents Sea on her way to her Atlantic Ocean patrol area.

The date of this undersea interception was March 17, 1978. The place: 70 degrees north latitude, 4 degrees east longitude, about 200 miles above the Arctic Circle in the frigid waters of the Norwegian Sea. Just to the south was the Greenland-Iceland-United Kingdom (GIUK) Gap, a natural funnel through which any Soviet submarine would have to pass after leaving her home waters in the Barents Sea. U.S. and Soviet submarines had made the North Atlantic a potential nuclear battlefield, and the GIUK Gap was the gateway to it. On the seafloor of the Norwegian Sea was a vast secret network of listening devices, termed the SOSUS (sound surveillance system) net, established by the U.S. Navy to track Soviet submarines as they departed for their patrol areas. Here a Soviet SSBN, a nuclear-powered ballistic missile submarine, was expected to emerge from Russian home waters and proceed into the Atlantic Ocean to commence her patrol—targeting cities and military installations in the eastern half of the United States. Here *Batfish* had come to lie in wait for her to pass.

In the spring of 1978, the Carter Administration's détente with the Soviet Union was wearing thin, and one reason was concern over Soviet missile submarines cruising off both U.S. coasts.

From their patrol "boxes," or operational areas, already known to U.S. intelligence analysts, these submarines could aim their 1,600-mile-range nuclear-tipped missiles at targets on the coast and inland.

Rear Adm. Sumner Shapiro, now retired, had by mid-1978 become the director of Naval Intelligence. "We had been following these missile submarine operations throughout the '70s," he says. "We had ASW [anti-submarine warfare] aircraft and other systems monitoring them, but we wanted to find out as much as possible about their capabilities and methods of operation. We wanted to know what their vulnerabilities were. For

"Conn, Sonar. Sonar contact bearing zero-six-two. Classified possible Soviet submarine!"

that, there's just nothing like another submarine to do the job.

"Only by tracking a Soviet boat with one of our own could we get the kind of fine-grained acoustical data and other technical and operational information that would tell us what they were doing—and could do," he says. In addition, tracking a Soviet missile submarine would provide invaluable real-world training for U.S. submariners. "The idea was to understand where and how the Soviet SSBN operated and to be able to get him beforehand, if you thought he might be about to fire his missiles," says Shapiro.

Such concerns had led to the Navy order that sent *Batfish* to sea. She would be an invisible instrument of national security, seeking to intercept a Soviet missile submarine and to follow her throughout an entire patrol without being detected.

Fast-forward now to an early morning in mid-June 2000. Another U.S. Navy submarine slips unobtrusively from her pier at her Norfolk, Virginia, home port. As is the custom in the submarine service—not for nothing is it known as the Silent Service—no fanfare accompanies the departure of USS *L. Mendel Rivers*, SSN 686 (a nuclear-powered attack submarine), a sister ship of *Batfish*. Though *Rivers*, like *Batfish*, was designed as a hunter and killer of other submarines, she has spent much of her long career engaged in intelligence-gathering operations of various sorts.

During this June week, however, *Rivers'* mission is not to gather information but to convey information. On board, in addition to her regular complement of about 115 officers and men, are a retired rear admiral and this writer. The rear admiral is Thomas W. Evans. Twenty-two years before, as a 41-year-old commander, Evans skippered USS *Batfish* on her historic 77-day trailing mission.

The present task for Tom Evans and *Rivers'* commanding officer, Comdr. David A. Portner, and his crew: to re-create for me a bit of *Batfish*'s remarkable accomplishment. Since *Batfish* was decommissioned in 1998, sister ship *Rivers* will have to stand in as a time machine that will take Evans and me back to the Cold War and the days of *Batfish*'s top secret mission, code-named Operation Evening Star.

The story of Evening Star began as *Batfish* returned from a patrol at the end of January 1978 to her home port of Charleston, South Carolina. As usual, no one could tell his family, friends or anyone else where he had gone or what he had done.

Suddenly, late in February, *Batfish*'s skipper, Evans, was ordered to report to the headquarters of Submarine Force, U.S. Atlantic Fleet (SUBLANT) in Norfolk, Virginia. There he learned that he had five days to get his crew and submarine ready to leave on a new top secret mission.

Back in Charleston, he told his crew. "I know this is tough," he said, "but we are the submarine of choice. This is what we're paid for." To me he remembers: "No one wanted to be left ashore, especially the sonarmen. It was a job they loved to do."

Batfish, a fast, deep-diving submarine (officially, her top speed was in "excess of 25 knots" and her diving depth "greater than 800 feet"), and her sister submarines were quieter than their Soviet quarry. Their crews also differed. Only trusted Soviet officers were highly trained. About half of the crewmen of a typical Soviet boat were draftees with little or no technical background. All American submariners were volunteers, well trained before they stepped aboard, and they alternated on-the-job training at sea with schooling ashore throughout their careers. Except for Evans, some of his officers and a couple of chief petty officers, all 120-odd men of *Batfish* were young. At the age of 24, Petty Officer First Class Dan Lawrence, a sonar watch supervisor and one of Evans' top sonarmen, was considered an old man by the kids who worked under him. "Lawrence was a wizard," says Evans. "He was like the sonarman Jonesy in Tom Clancy's *Hunt for Red October*."

The intensely dedicated men who served in attack submarines like *Batfish* and *Rivers* lived and worked in a steel tube about 300 feet long and 32 feet in beam, with about 4,400 tons of

displacement on the surface. Though by no means small, these boats were dwarfed by the giant "boomers," or missile boats, of both the American and Soviet navies.

On board *Rivers* with me, Evans looks around the attack center and pronounces it about the same as *Batfish*'s in 1978: muted light, periscopes, the officer of the deck in charge of the watch section, the chief of the watch and crewmen at their posts watching dials and displays and steering the ship. Evans next ushers me into the quiet dimness of the nearby sonar room. Not much has changed here, either. The sonar supervisor sits on a high chair near the door. Before him in a row are the five sonarmen of the watch. Wearing earphones and hunched before the green glow of monitors, they are hearing and seeing the sounds of merchant ships. "Their propeller blades tend to be dirty, not clean like warship blades," a sonarman tells me. "And we can hear the difference." I put on earphones and hear "biologics"—the snaps, pops and crackles of shrimp and schools of fish. The Atlantic is a noisy place 400 feet down.

When the submarine raised her antenna, Evans got a message that a P-3 had found what appeared to be the Yankee.

Weeks later, Dan Lawrence and Tom Evans take me to the Naval Surface Warfare Center in West Bethesda, Maryland. Lawrence, now retired from the Navy, works here developing school curricula for sonarmen. He uses computer graphics to show me how the sound that goes into a sonarman's headphones becomes a visual display. Lawrence and Evans use many analogies as they try to explain their arcane art. Evans compares it to a bird-watcher searching for one exotic bird's song in the darkness and clamor of a tropical rain forest. Lawrence gives me this one: "You're driving down the highway in a car with all the windows covered. You're navigating by sound. There are trucks all over the road, and you've got to pull one car's signature out of all the rest. Sometimes you're right and sometimes you're wrong."

With Evans' help, I navigate the newly declassified pages of the report he wrote for the Chief of Naval Operations at the end of the 1978 mission. *Batfish*'s orders called for her to "proceed north to the Norwegian Sea, and locate, follow and track the next Soviet nuclear-powered missile submarine to exit Russian home waters proceeding to patrol station."

On March 2, 1978, *Batfish* departed Charleston on the surface. Near a buoy marking the end of the channel, a landing craft appeared alongside with a secret submarine acoustical device, a towed sonar array 1,100 feet long, with hydrophones strung in a rubber tube along the last 300 feet. It was an extraordinarily sensitive auxiliary sonar system. Divers went down to attach one end of the cable to a plug on the hull, connecting the array to the sonar system inside *Batfish*. "We would drag that thing around behind us for the next two and a half months," Evans remembers.

The towed array wasn't the only complicated and demanding piece of equipment. A nuclear-powered submarine is arguably one of the most complex devices ever built. The hull of an attack boat like *Batfish* or *Rivers*, crammed with sonar gear, propulsion machinery, weapons and everything else needed to operate and sustain life

Passageways are so narrow that men have to squeeze by each other dozens of times a day.

submerged for as much as three months, is divided into three levels and many compartments and spaces. Passageways and steep ladders so narrow that men have to squeeze by each other dozens of times a day connect the various parts of the boat.

While *Batfish* headed from Charleston toward the Norwegian Sea, the Navy's submarine detection system, the seafloor SOSUS network, was already listening for passing Soviet boomers. Overhead were Navy P-3 Orion antisubmarine patrol aircraft, bristling with gear to detect and track submerged submarines. From SOSUS and the Orions would come data that would be analyzed at submarine headquarters in Norfolk and passed along to the undersea hunters.

As *Batfish* took up position at the northern end of the Norwegian Sea, Evans was confident that the Navy ASW team would find a Soviet submarine. And then at 2139 hours Zulu time (4:39 P.M. EST), on March 17, 1978, *Batfish* got her boomer. Operation Evening Star was under way.

The Soviet submarine was a Leninets-class missile boat. These were called the "Yankee" class by the U.S. Navy, which designates Soviet submarine classes using letters of the NATO phonetic alphabet; hence Echo class or Whiskey class—or Yankee. *Batfish* sonarmen had studied archival tapes of sonar recordings from every type of Soviet submarine until they could hear the sounds in their sleep. *Batfish*'s highly sensitive listening devices had detected the unique sounds and machinery noises that identified this one. Yankees were big boats, 425 feet long, nearly 8,000 tons on the surface, carrying 16 nuclear-tipped missiles.

"Our first task was to establish a trailing position well behind the Yankee from which we could maintain tactical control," says Evans. "Maintaining tactical control means you're in that zone where you're close enough to hear the noises emitted by their machinery and propeller through all the other noises in the sea, but not too far away—where you can hear him and he can't hear you." He decided to stay between 7,000 and 10,000 yards behind the Yankee. He

and his executive officer, or "XO" in Navy parlance, Lieut. Comdr. Jim Davis, would take turns standing 12-hour watches in the attack center.

In the sonar room, men listened intently through headphones and stared at green screens eerily lit with slowly cascading sets of lines, like bar codes of light. They rotated small control wheels, trying to get the best bearing to the Yankee by focusing their passive sonar on the target. Inside *Batfish*'s rounded bow was a giant sonar sphere studded with 1,254 hydrophones—the ears of the submarine. All these hydrophones did was listen. (Active sonar sends out pings that bounce off a target and return to the submarine. Those pings would reveal a submarine's presence and so were almost never used by U.S. submarines.)

When a sonarman got a bearing, he picked up a grease pencil and marked the Yankee's latest position and direction of motion on a bearing dial. A log keeper put the information in the sonar log, and the supervisor passed it along to the attack center. There, under the watchful eye of the officer of the deck, the tracking team plotted the relative positions of the two submarines with pencil and graph paper.

The tracking problem was made more difficult by the characteristics of the long towed sonar array. Although the array was highly sensitive and increased the range at which they could hear another submarine, it did not tell the sonarmen whether the other submarine was on the port or starboard side of their own boat. Evans frequently had to use a set of "ambiguity maneuvers" to find the correct bearing to the target, guiding his submarine in a way that revealed which side the other submarine was on.

Naval Intelligence had provided our attack submarines with information that revealed the detection ability of Yankees. The team's "fire control solution" gave the officer of the deck the information he needed to steer *Batfish*, keeping her just far enough behind the Yankee to hear her, but far enough away so that the Yankee could not hear *Batfish*.

The first day passed easily. Especially noisy on one side, the Yankee was putting out enough sound to give sonar a steady contact. Then, a day and a half into the chase, a fierce North Atlantic storm with gale force winds and heavy seas moved in, creating severe background noise.

When Evans tells me about the 1978 storm, I ask him how a storm on the surface could have such an effect 400 or 500 feet down. "Storms are very noisy even when you are submerged," Evans says to me as we stand in *Rivers*' attack center, serenely calm at 500 feet beneath the surface. "That storm was blanking out all other sound. You couldn't hear another submarine 100 yards away."

On March 20 *Batfish* rose to periscope depth to put up an antenna and send a radio message to SUBLANT headquarters in Norfolk. After 51 hours and 350 miles, she had lost

Batfish turned away and slowed down. "We didn't want to be the catch of the day."

the Yankee in the storm. SUBLANT immediately contacted a P-3 Orion base in Iceland. Because *Batfish* knew the probable bearing of the Yankee, a P-3 could fly down that line and drop sonobuoys. These expendable listening devices detected undersea sounds and transmitted their frequencies to the circling P-3. Operators in the P-3 analyzed the sound frequencies and determined whether they added up to the signature of a Soviet submarine.

On March 21, when the submarine again raised her antenna, Evans got a message saying that a P-3 had found what appeared to be the Yankee. Five

times *Batfish* went up to get current P-3 reports as the aircraft led her back to the Yankee. After hours of faint and intermittent contact, a grateful *Batfish* reacquired the Soviet boomer and reestablished the pursuit.

"Our intelligence publications were very good about what we assumed to be the propulsion arrangements of this particular class," Evans says. "We had a pretty good contact. We could calculate the speed, and sometimes we could hear the propellers going around."

Day by day, the silent chase went on, a curious mixture of tension and tedium. In the meantime, life aboard *Batfish* followed a long-established pattern of watch standing, maintenance, studying, eating and sleeping.

Though the food on the attack boats is excellent, the living and working spaces are cramped almost beyond description. Sometimes five or six officers share a 6 foot by 8 foot washroom—with basin, shower and toilet—at the same time.

Twenty-four men berth in a space about 15 by 20 feet, each in a narrow bunk with about 18 inches clearance to the next one above. Each crewman's berth provides all of the private space he has on the boat.

As the submarine does not want to advertise its presence to enemy listeners, it usually maintains radio silence. One side effect of this policy: for the entire length of *Batfish*'s patrol, the men had no contact with their families beyond "familygrams," the messages they occasionally received from loved ones ashore. Restricted to 40 words or less, the familygrams are models of brevity: "Carolyn doing very well in school. Azaleas blooming. Car fine. Love." read one message to a *Batfish* sailor. The men also signed up to wash their Skivvies, white T-shirts, socks and blue uniform coveralls in the boat's single washing machine.

As the men of *Batfish* slipped into a routine, the chase went on. Evans knew from intelligence reports that the Soviet boomer would travel down the west coast of Ireland, past the Azores, and move over into the "Yankee box," a Soviet submarine operating area in the West Atlantic from which the Yankee's missiles could reach the United States. Once in the box, she would slow down and begin to circle clockwise slowly around the area until her patrol was finished. To maintain tactical control, Evans had to plan two or three days ahead, taking into account constantly changing acoustical conditions, weather predictions, the topography of the sea bottom as the submarines passed over it (which affected acoustics), merchant ship traffic, fishing fleets and, of course, the movements of the Yankee.

Did Evans ever think about his opposite number, the Yankee's skipper? "Oh, yes," he says. "I tried to imagine what kind of a guy he was. Was he by-the-book or imaginative? If he were the latter, he would be a much more formidable opponent. If he changed some mode of operation, I had to guess why he was doing it and judge whether it was effective." He turned out to be by-the-book.

"But," says Evans, "he had someone on his boat that I didn't have to cope with—a political officer watching everything he did." Every Soviet submarine carried a Communist Party officer.

Says Evans, "I wondered about the political officer too. What was *he* like? Would he let the captain be aggressive?" All imponderables, and Evans says, "We didn't know much about their captains. The Soviets kept their names secret."

Even so, the men of *Batfish* soon felt they were beginning to know the men

of the Yankee. U.S. Navy ships run on Greenwich Mean Time (also known as Universal Time). In another use of the phonetic alphabet, the Navy calls this Zulu time. On the *Batfish*, watch standers soon began to notice that every day, at precisely 0600 Zulu time, the Yankee switched something on, possibly a generator. "The frequency line would come up on the sonar scope like a dandelion in a field," Dan Lawrence says. "We could put an electronic tracker on it, and we could use that stable line to determine the range and bearing to the Yankee."

The Yankee, too, was slipping into a daily routine, one that fed a steady stream of sound effects to *Batfish* listeners. Routine can save a submarine or sink her. Because a wrong move can doom her, everything is done by the book. But that very routine can give a tracking submarine the kind of advantage that the Yankee handed to *Batfish*. All submarines have the same problems to solve, and all must obey the laws of physics. Like *Batfish*, the Yankee had to rise regularly to periscope depth and receive communications from her headquarters. Because a submarine is noisy and vulnerable when she goes to periscope depth, she uses that time to do other noisy chores, such as getting rid of garbage and blowing the contents of her sanitary tanks. Knowing that the Yankee noises would mask *Batfish*'s own noises, Evans often had *Batfish* go up when the Yankee did.

Batfish watch officers and sonar operators got so good at interpreting Yankee maneuvers and noises that they could tell when the Soviet submarine was getting ready to go to periscope depth and do her chores. *Batfish*'s sonar could detect an increase in the Yankee's propeller revolutions and pick up the movement of the stern diving planes.

Frequently the Yankee went through a maneuver the American sailors

The galley had run out of peanut butter, a great hardship.

called the Crazy Ivan. Submarines do not have rearview mirrors. The way the sonar apparatus is arranged, a submarine can "see" (hear) straight ahead or to either side. Installed behind a submarine's bow sonar sphere are baffles that prevent the sonar from hearing its own ship noises—or anything to the rear, such as a trailing hostile submarine.

The Crazy Ivan is a maneuver technically known as clearing baffles—changing course so that the submarine can "look" behind, either by passive listening or by sending out a burst of active sonar that would spotlight any trailing submarine. To a listening U.S. sonarman, the ping of the Yankee sonar sounded like the sharp clapping together of two blocks of wood, and that became the official name for it: BOW (Blocks-of-Wood) sonar.

A typical Crazy Ivan would begin with the Yankee slowing down and starting a turn to the left or right. *Batfish* would frequently lose all sonar contact as the aspect of the Soviet submarine changed. *Batfish* would slow also, and commence a slight turn away from the Yankee. As *Batfish* regained contact, the attack team would analyze the new course and speed of the target. To avoid detection during these maneuvers required keen instinct, concentration and patience to avoid overreacting or making any noise. (Throughout *Rivers*, signs remind, "Think Quiet.")

"Also," says Evans, "since we did not know the cruising depth of the Yankee, we had to avoid coming too close. The risk of an inadvertent close encounter was completely unacceptable."

The execution of the Crazy Ivans was as regular as clockwork: exactly 45 minutes after the hour or 20 or 30 minutes after other hours, leading Evans to deduce that the Yankee crewmen were on watch for four hours, then off for eight. Some baffle-clearing maneuvers began with a turn to port and others started with a turn to starboard. *Batfish* control room watch officers Pat Dunne, Bruce Lemkin, Ken Landers and Don Bridges decided that at least one Yankee officer of the deck was left-handed because he always turned to port.

As most of the Yankee's noise came from the port side, Evans tried to keep *Batfish* tracking at an angle to the left of the Yankee. So the BOW sonar never came close to nailing the pursuer.

Batfish trailed the Yankee through her entire 19-day alert period of the patrol as she slowly made the circuit of the Yankee box. Attack submariners say that an SSN returns home only when the food runs out. When the boats go out on their lengthy patrols, the tiny passageways

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are paved with boxes of canned goods, forcing the men to walk stooped over under the dozens of cables and pipes strapped to the overhead. As the voyage progresses and the boxes are emptied and removed, the men can straighten up.

Toward the end of April, changes in the Yankee's daily routine indicated to *Batfish* observers that her alert period was ending. As the Yankee headed home, *Batfish* sonarmen observed what Evans' mission report calls a "more relaxed posture." The Yankee executed fewer baffle-clearing maneuvers and rarely used her BOW sonar. Now *Batfish*'s crew could start counting the days toward the end of their mission.

All was going well until day 46 of the mission, when Dan Lawrence, on watch in the sonar room, began to hear clinking and clanking sounds. He knew at once the source of the sounds: weights and chains banging together on the bottom of fishing nets. Somewhere ahead and above him and his submarine, fishing boats were lowering nets into the water. Lawrence passed the word to the attack center. *Batfish* turned away and slowed down, gliding through the water, staying beyond the clutches of the nets. "We didn't want to be the catch of the day," says Evans.

The sounds of fishing boats were all around—the whining of the hydraulic winches lowering and working the nets, the rumble of their diesel engines as they moved about in the North Atlantic, and many clinks and clanks. Meanwhile, schools of sea creatures squealed, whistled and snapped in raucous protest at the rude intrusion of the nets. "When he was going through the trawlers," Lawrence recalls, "he was having the same problems that we had. He's reacting to nets. We're reacting to nets—and to him."

But the sounds that the sonarmen most wanted to hear—the sounds of the Yankee—had vanished in the noise of the fishing fleet. While *Batfish* eased her way out of the busy fishing ground, Evans turned to his tracking team in the attack center for the probable bearing to the Yankee, recorded every three minutes or so for more than 40 days. From the voluminous record, Evans could lay out a probable course for the Yankee. Much to everyone's relief, *Batfish* quickly reacquired the unique sounds of the Soviet submarine. Evans had not lost tactical control.

As the Yankee exited the GIUK Gap, more acoustical headaches: explosions began to blast through the earphones of the sonarmen as oil exploration ships in the North Sea off the coast of Norway set off detonations near the seafloor as they probed the strata beneath. Sound waves bounced from the bottom back up to the surface and back down again, creating a reverberating cacophony that blanked the sonar screens and deafened unwary sonar operators who failed to anticipate the next boom. "We were in shallow water," Lawrence says. "Tracking through there was a trip. It was horrible! When these things detonated, they created white noise—a big pulse. We had to reject the noise. So we kept positioning ourselves to mask the noise."

Batfish had stayed with the Yankee for 50 days. She surfaced off Charleston after 77 days submerged.

The oil hunt momentarily threatened the submarine hunt. But, by constantly repositioning *Batfish*, Evans says, "We tracked the Yankee so that the towed sonar array was least affected by the explosions."

This was the last crisis of the chase. Arduous, tense and tedious, the hunt was almost over. On May 5, as the Yankee headed home, Vice Adm. Kenneth M. Carr, commander of the Submarine Force Atlantic Fleet in Norfolk, ordered *Batfish* to end Operation Evening Star. *Batfish* had stayed with the Yankee for 50 days, traveling 10,369 shadowing miles to record the Yankee's 8,871 miles. Carr sent a "well done to all hands" message to the ship.

Batfish surfaced off Charleston on May 17 after 77 days submerged. The galley had run out of peanut butter—a great hardship. A Navy tug carrying the harbor pilot met the submarine at the entrance to the harbor. And, to the surprise of everyone on *Batfish*, Admiral Carr was a passenger. In a rare gesture of appreciation, he came aboard and rode *Batfish* to her berth at the naval base. There, he assembled the crew and, with their families watching on the pier, pinned medals

on 16 men Evans had selected for special recognition. Later, the Secretary of the Navy bestowed the Navy Unit Commendation upon the *Batfish* and her crew, and President Jimmy Carter awarded the Navy Distinguished Service Medal to Commander Evans and the Legion of Merit to his executive officer, Lieutenant Commander Davis. Of course, none of the officers and men who had been decorated could ever tell anyone why. Not until now.

For men like Adm. Thomas Evans and Senior Chief Sonarman Dan Lawrence, veterans of the Silent Service, talking to me about a top secret mission is something they had never expected to do. They had sworn themselves to lifelong secrecy about what they and their submarine did. The oath still stands, but the Navy allowed an exception when it made them the spokesmen for *Batfish*'s mission. The explanation for the sudden end of silence: a centennial. In 1900 the Navy bought its first submarine, *Holland*, named for its creator, John P. Holland. To mark the centennial, the Navy submarine force decided to focus on its most recent history, and authorized an exhibition, "Fast Attacks and Boomers: Submarines in the Cold War," in the Smithsonian's National Museum of American History. Tom Evans, now a Smithsonian docent, helped with the exhibition.

What was the name of the Yankee? What was the name of her captain? I asked a former commanding officer of a Soviet submarine to see if he could find out. Weeks later, he told me that he had asked the proper authorities in Moscow and had been informed that records of 1978 missile patrols have not yet been declassified.

As *Rivers* comes in from her three days at sea, Tom Evans reminds me about the Walker-Whitworth espionage case and its impact on U.S. submarine operations. Warrant Officer John A. Walker, Jr., who had served on U.S. nuclear-powered submarines and had been a communications watch officer, had recruited his brother, his son, and another Navy man named Jerry Whitworth. John Walker had begun selling secrets to the Soviet Union about 11 years before Operation Evening Star. In 1976 Walker retired from the Navy but not from treason. The Walker spies were all arrested in 1985, and three of the four are serving life sentences. The full impact of their treachery will probably never be fully known. But one significant change did take place that affected the Submarine Force. The Soviets, now aware of the great acoustical advantage that U.S. submarines enjoyed, embarked on a major effort to make their own submarines much quieter.

Says Admiral Shapiro, "If there was a silver lining to the Walker-Whitworth treachery, it was that this helped convince the Soviets that our submarines were superior to theirs, and that we could trail them almost with impunity. Missions such as that of *Batfish* demonstrated to us—and, through the Walker gang, to the Soviets—that we could keep close tabs on their boats and, if necessary, neutralize them."

As I leave *Rivers* and as the echoes of *Batfish*'s mission fade, I take away an impression of what such feats meant to the security of the nation. Admiral Shapiro believes that knowledge of our ability to track their submarines anywhere in the world's oceans made the Soviets realize that their ballistic missile submarine force, which they counted on for reliable second-strike capability, was not invulnerable. This realization could have been a major factor in bringing the Cold War to an end. If so, then the U.S. submariners of *Batfish* and other boats of the Navy's Silent Service made history. Now at least part of their story can be told.

Thomas B. Allen, author of Shark Attacks, *writes frequently on military and natural history subjects. Award-winning freelance artist Peter M. Fiore lives in Pennsylvania.*

Tarzan
the Eternal

FROM THE RESTLESS IMAGINATION OF **EDGAR RICE BURROUGHS** SPRANG THE MOST TIMELESS OF SCREEN CHARACTERS

Ready for adventure, the 15-year-old Burroughs (inset) stands tall on an Idaho ranch. The quintessential screen Tarzan, Johnny Weissmuller, rides an Asian elephant that has been outfitted with fake African elephant ears in *Tarzan the Ape Man* (1932).

BY BRUCE WATSON

During the mid-1920s, a strange jungle fever swept much of the world. From Japan to Iceland and Latin America, thoroughly modern citizens imagined themselves as lords of the jungle swinging from branch to branch on vines. Across the United States, tribes of children took to the trees. In Germany millions were inspired by the heroics of an ape-man. And throughout the Soviet Union, readers in offices, streetcars and factories devoured an American book about a boy raised by African apes. In one remote village, a group of peasants stood, mouths agape, as a soldier read them the story.

Meanwhile, back at his ranch, a bald man in his late 40s paused at his typewriter. Looking out his window, his mind wandered across the empty savanna of California's San Fernando Valley. More than a decade had passed since he had published his first jungle saga. His mind brimming with other tales and settings, he had hoped never to write another sequel. But the public's appetite for more stories about Tarzan had grown voracious: he had created a media monster and become enslaved by his own creation. Edgar Rice Burroughs paused for a minute, then looked again into his weary imagination. There he saw vines, like story lines, tangled but inviting. The typewriter clacked as he churned out yet another Tarzan story to satisfy his vast audience.

Swinging down through the decades, Tarzan has become one of the most enduring and popular fictional characters in America. In comic strips, radio serials, TV series, more than 40 movies and dozens of novels, the guy with the big muscles and the loincloth just keeps coming back. The man behind Tarzan also cut a wide swath through the jungle of pop culture. In the first half of the 20th century, the most widely read American author was not Hemingway, Faulkner or Steinbeck, but Burroughs, whose paperbacks and pulp stories lay strewn across the bedrooms of countless escapists like himself. Beyond Tarzan, Burroughs' hyper-driven imagination has taken readers to the subterranean kingdom of Pellucidar, the savage society of Barsoom, and an atlas worth of netherworlds and lost cities. His 74 novels have sold more than 100 million copies and been translated into a babel of languages. Yet Burroughs was more than the sum of his creativity. He was among the first writers to incorporate themselves. Long before movies came with merchandising rights and a battery of lawyers, Burroughs turned Tarzan into the first mass-market action hero whose royalties supported the author's own high-flying adventures. All in all, not bad for a man who didn't publish his first story until he was nearly 40, and who persisted in calling his stories "rotten."

Midway through his career, when a publisher asked him to provide a brief biography, the author of Tarzan was stumped. Should he admit that he had never been to Africa? Should he let on that every venture of his before becoming a writer had been a failure? Instead Burroughs submitted a parody. Seems he was born in China where his father was the military adviser to the empress. Raised in Peking's Forbidden City, he developed a taste for "two of my favorite studies, Chinese philosophy and Chinese ceramics." Taken to America, he "was kidnapped by gypsies and held by them for almost three years." After graduating from Yale summa cum laude, he explored Africa in search of Dr. Livingstone, escaped cannibals only to be shipwrecked, then made his way to the court of the Russian czar where he met his wife. "I have tasted fame—it is nothing," he concluded. "I find my greatest happiness in being alone with my violin." The facts of his life were more mundane. He did not, for example, play the violin. But then, for a man of Burroughs' prodigious imagination, facts were mere portals to fantastic worlds of unreality.

His father, Maj. George Burroughs, was a Civil War veteran who ran his family like a platoon. Meals were at 7:30 A.M., noon and 6 P.M. sharp. Each was announced with the single strike of a large gong that sent a reverberating sound into every corner of the family's stately

PP. 62-65 BURROUGHS MEMORIAL COLLECTION, UNIVERSITY OF LOUISVILLE LIBRARY (6)

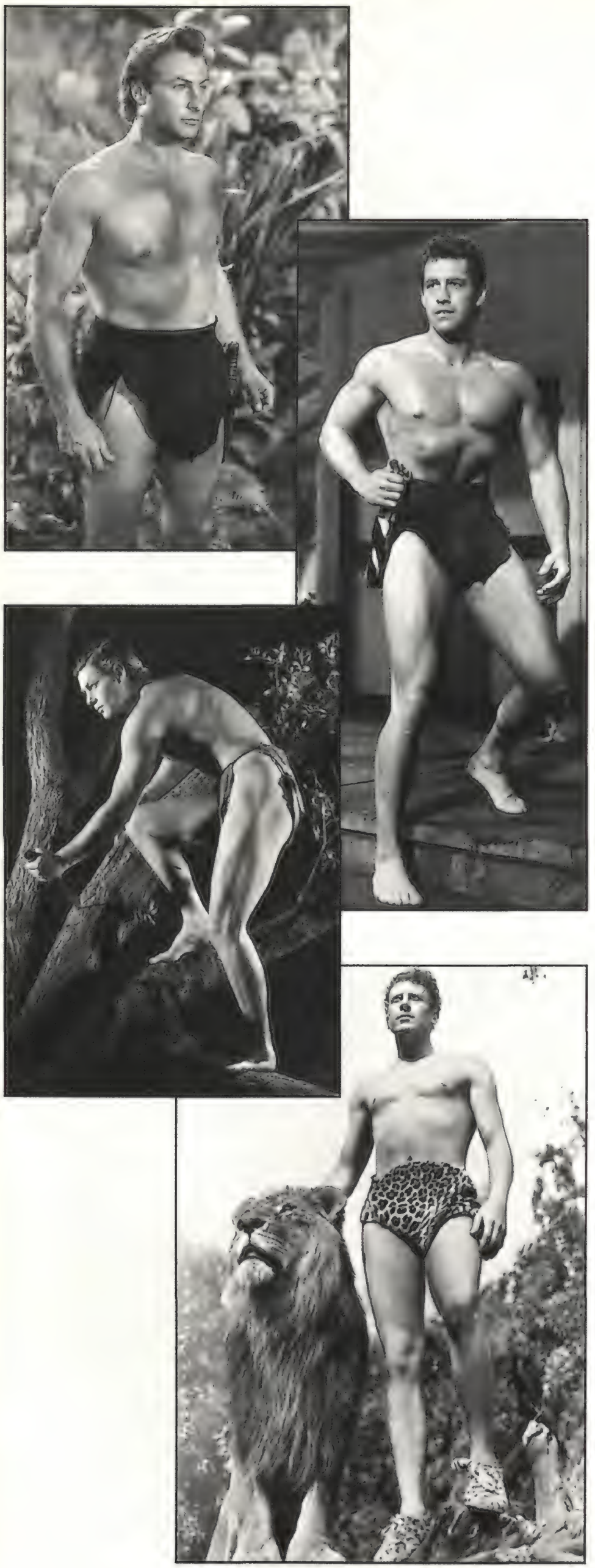
home in Chicago. The four Burroughs boys had better not be late. Edgar, born in 1875, was the youngest and freest spirit. By the age of 5, he was writing doggerel and doodling precociously. Yet Ed (he considered Edgar "the sillyassest name ever hitched to a male") was also a rebel, skipping school with a friend to go smoke "and feel real devilish." After a bout of ill health, his parents sent him at 15 for a summer on a ranch in Idaho. That fall he was shipped off to Phillips Academy, in Andover, Massachusetts. He lasted just long enough to be elected class president before bad grades sent him packing. He would have preferred to study art—he sketched constantly—but his father had a more manly career in mind.

Shortly after Ed Burroughs enrolled in the Michigan Military Academy, the major received a telegram: "Your son deserted Thursday. Letter will follow." Ordered back to the academy, he finally knuckled down. He graduated as a captain and earned an appointment to West Point, but failed the qualifying exam. After briefly teaching the subject of cavalry at his alma mater, he enlisted in the legendary U.S. 7th Cavalry. Custer had been dead for 20 years, however, and Burroughs' military career was far from the stuff of legend. At Fort Grant in the Arizona Territory, he shoveled manure, slept in a tent and contracted dysentery. His lone adventure was a brief patrol in search of Apache. He found none. Calling himself a "bum soldier," he wrangled a discharge after only ten months. A year later, when the Spanish-American War broke out, he tried to join the Rough Riders but was rejected. "I am always late for the thrill," he later lamented. "I always get to the fire after it is out."

Failure of one kind or another seemed to stalk this muscular 5-foot-10-inch man who had a penchant for things military. In 1900 Burroughs married a Chicago socialite and settled down to work at Major Burroughs' battery company. He lasted three years, then set off on another quest. With his wife, Emma, in tow, he went back to Idaho, where he and his brothers dredged for gold on the Snake River. Yet he also dreamed the dreams of a world-class Walter Mitty. In his spare time at the battery company and in Idaho, he wrote and illustrated "Snake River Cotton-Tail Tales" for his niece and a lengthy fantasy set in the land of Bray Pzvrtjhk.

Jack, Joan and Hully Burroughs join their father (opposite) on the 1920 set of *The Son of Tarzan*, the third of more than 40 Tarzan films. A gallery of silent-era Tarzans (from top): Gene Pollar, *The Revenge of Tarzan* (1920); P. Dempsey Tabler, *The Son of Tarzan* (1920); Frank Merrill, *Tarzan the Tiger* (1929); Elmo Lincoln, *Tarzan of the Apes* (1918).

BOTTOM: PHOTOFEST



When the gold dredging turned up mostly sand, he got a job patrolling a railroad yard in Utah. The adventure ended when he and Emma auctioned all their furniture to buy train tickets home to Chicago. There he sold lightbulbs and candy, oversaw the steno pool at Sears, Roebuck and Co., then ran his own ad business into the ground, sold elixir and peddled a self-help correspondence course. Decades later he summed up these years in just four words: "I am a flop." Fortunately for generations of readers and filmgoers, the yearnings and tribulations of a flop provided the perfect backdrop for creating "pulp" fiction.

To understand Burroughs' career, readers must imagine the time when America's media had little mass. In the early 1900s a handful of movies showed in nickelodeons. Some families had an Edison phonograph on the shelf. Unless one played a parlor piano, however, one of the only homegrown entertainments was reading. Boys like Burroughs had been raised on dime novels, but a brand-new medium tickled the common reader. Named for the cheap paper they were printed on, pulp magazines such as *The All-Story* and *Argosy* were selling millions of monthly issues. Inside their lurid covers, purple prose sent readers down mean streets of mystery, riding herd through the Old West or in search of pirates' treasure. Pulp writers padded their stories to hack out a living at the going rate—a tenth of a cent per word. Burroughs had always been a reluctant but highbrow reader. He hated Dickens, which his father read aloud, but loved the classics, poring over Homer, Ovid and Virgil. Yet the racks of pulp magazines exerted a strong pull on him, especially in 1911, when he found himself with few customers while selling pencil sharpeners. "I remember thinking that if other people got money for writing such stuff I might, too," he recalled, "for I was sure I could write stories just as rotten as theirs."

Scribbling his first saga on the back of old letterhead from his brother's stationery business, the bored, broke author cast his vision to the stars. Jules Verne had taken readers to the Moon. H. G. Wells' *War of the Worlds* had brought Martians to Earth. But Burroughs imagined Mars as a battlefield. His hero, Confederate veteran John Carter, is cornered by Apache in Arizona. Taking refuge in a cave, he hears sounds from deep in the darkness. He rises in panic. Moonlight shows him his own body lying on the ground. Outside, he stretches his arms to the

Tarzan comes of age (from top): Lex Barker, *Tarzan and the She-Devil* (1953); Gordon Scott, *Tarzan's Fight for Life* (1958); Johnny Weissmuller in the publicity shot for *Tarzan the Ape Man* (1932), one of his 12 films as the lord of the apes; Glenn Morris, *Tarzan's Hidden Jungle* (1955).

TOP AND BOTTOM: BURROUGHS MEMORIAL COLLECTION, UNIVERSITY OF LOUISVILLE LIBRARY; PHOTOFEST (2)

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stars and feels himself "drawn with the suddenness of thought through the trackless immensity of space." Generations before *Star Trek* beamed anyone up, Carter opens his eyes to find himself on Mars.

In "Under the Moons of Mars," Burroughs detailed the flora, fauna and history of the planet natives call Barsoom. Taken prisoner, Carter falls in love with the beautiful princess Dejah Thoris. He is caught in a war between the ugly green Tharks and the princess's beleaguered Heliumites. In the end, he saves Barsoom from environmental catastrophe. Burroughs' prose was often tangled; he even apologized to his editor for his "rotten" English. Yet his remarkable debut created a world that remains as vivid and original today as it was in 1912. Recognizing this new talent, *The All-Story* bought the piece for $400. When his editor suggested he try a medieval romance, Burroughs wrote late into the night. For most of his stories, he would always begin by making a work sheet of his fantasy realm, listing characters, places and creatures. He would sketch detailed maps and create entire alphabets, currency exchange rates, time zones and whole glossaries of native language. Meticulous as a major, he recorded the exact minute he finished his writing and the number of words he had written, usually more than 4,000, or 20 double-spaced pages, per day. He wrote his romance in three weeks, but his editor rejected it, asking instead for a sequel to his Mars saga. But Burroughs was already dreaming up a more primal adventure.

In 1899, in his copy of Darwin's *Descent of Man*, Burroughs had sketched an ape. He captioned the drawing "Grandpa." Darwinism and its harsh stepchild, social Darwinism, were then spreading throughout the Western world. Millions took as gospel the "primitive" nature of African tribes and Kipling's call to "Take up the White Man's Burden." Burroughs, a product of his times, was fiercely proud of his Anglo-Saxon heritage. Later, he would even flirt with eugenics, advocating the extermination of criminals and other "moral imbeciles." For now, he merely asked a simple question: What would happen to an infant "of a race strongly marked by hereditary characteristics of the finer and nobler sort" if he were raised in the jungle? His answer will surprise those who know Tarzan solely through the movies. Burroughs' hero is not just a jungle superman. He is also the son of a lord and lady and heir to the Greystoke estate. When not swinging through the trees, Tarzan teaches himself to read and write. By story's end, he speaks perfect English and French. Over his lifetime, Tarzan learns to wear fine English suits, quote Latin and fly airplanes. Nature, Burroughs suggests, can conquer nurture. Man can rise above his upbringing and win the girl. In October 1912 "Tarzan of the Apes" filled the entire issue of *The All-Story*. Its action, tender as an ape rescuing a child, frenzied as tribal warfare, was cinematic. Its dialogue, however, was stiffer than rain forest hardwoods: "Hundreds of thousands of years ago our ancestors of the dim and distant past faced the same problems which we must face. . . ." Ignoring such speeches, readers clamored for a sequel. Burroughs was skeptical, yet he was smart enough to know a meal ticket when he saw one.

Six months and three stories after Tarzan first appeared, Burroughs began writing full-time. To prime his prose pump, he kept an annual word count. In 1913 he wrote 413,000 words, the equivalent of five full-length novels. His memoirs summed up the following year: "In 1914 I write 400,000 words. Everything sells." His fertile mind bred scenarios that read like tabloid headlines: Mad Professor Creates Monster Men! Shipwrecked Boston Brahmin Meets Cave Girl on Desert Island! Yet he thickened his plots with a soldier's command of detail. Dabbling in science fiction, he imagined immortality pellets, atomic energy and gamma ray lasers, but he never strayed long from the swashbuckling heroism that was the pulp fan's meat and potatoes. In story after story, his lone, lean heroes took President Theodore Roosevelt's "strenuous life" to the jungle, the Earth's

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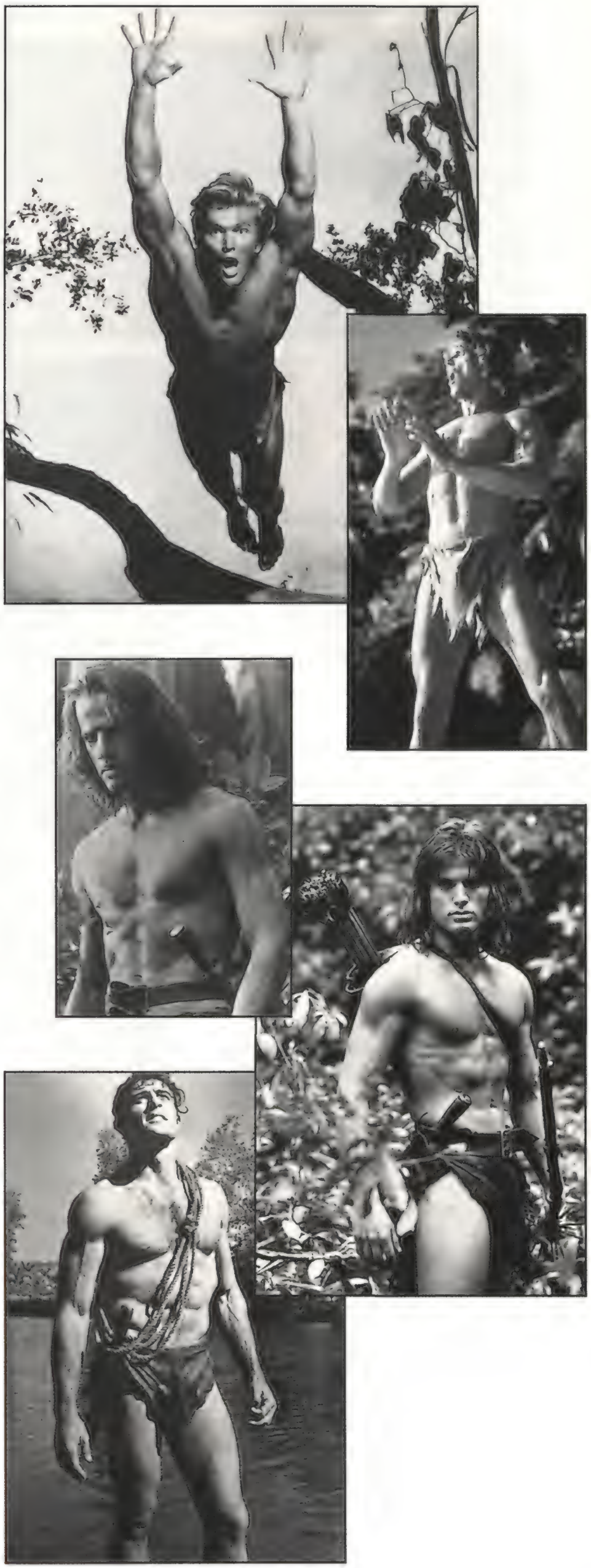
core and the stars, while taking Burroughs to the bank.

As the money rolled in, he rolled it out. Cars—Hudsons, Cords and Packards—were his favorite indulgence. He began wintering in Southern California, hoping the climate would cure chronic shoulder pain caused by typing 400,000 words a year. Then, in 1916, when car travel was a real adventure, he went "auto-gypsying" from Chicago to Los Angeles. On roads that were more dirt path than highway, Burroughs, his wife and their three children traveled less than 100 miles a day, camping, braving mosquitoes and snakes, and loving their freedom. Three months after leaving Chicago, they crossed the California desert on a dirt road and wheezed into Hollywood, where Tarzan would conquer the movies.

Ever since he first appeared in pulp, producers had been eyeing Tarzan, yet the jungle saga seemed impossible to film. What actor was up to wrestling a lion? And what studio was up to wrestling Burroughs, who fiercely defended his plots and royalties? Finally, in 1918, overcoming Burroughs' constant meddling, the first Tarzan movie was released. The silent spectacle featured 1,100 Amazon natives, 40 aerial acrobats, four lions, six tigers and, as Tarzan, Elmo Lincoln, who had appeared in *Birth of a Nation*. Burroughs despised the portly Lincoln, saying his ape-man should be "built more like a panther than an elephant." The author even asked that his own name be removed from the credits. Yet silent film audiences thrilled to such captions as: "The nearness of the clinging form, the warm touch of the first woman he had ever known, thrilled Tarzan with a new emotion." *Tarzan of the Apes* became one of the first films to gross more than $1 million.

In 1919 Burroughs bought a 540-acre ranch in the empty San Fernando Valley and named it Tarzana. Coyote, deer and bobcat roamed his ranch, along with his Angora goats. Dawn found him riding his horse, Colonel, across his spread before retiring to his typewriter to pound out title after title. *Tarzan and the Ant Men. The Moon Maid. Tarzan the Terrible. The Chessmen of Mars.* Less than a decade after he had pawned his wife's jewelry to pay bills, he lived in "one of the loveliest spots in the world." He tried to grow a wide variety of crops, but his thumb was not as fertile as his mind and his military style caused all the hired help to quit. As bills piled up, there was only

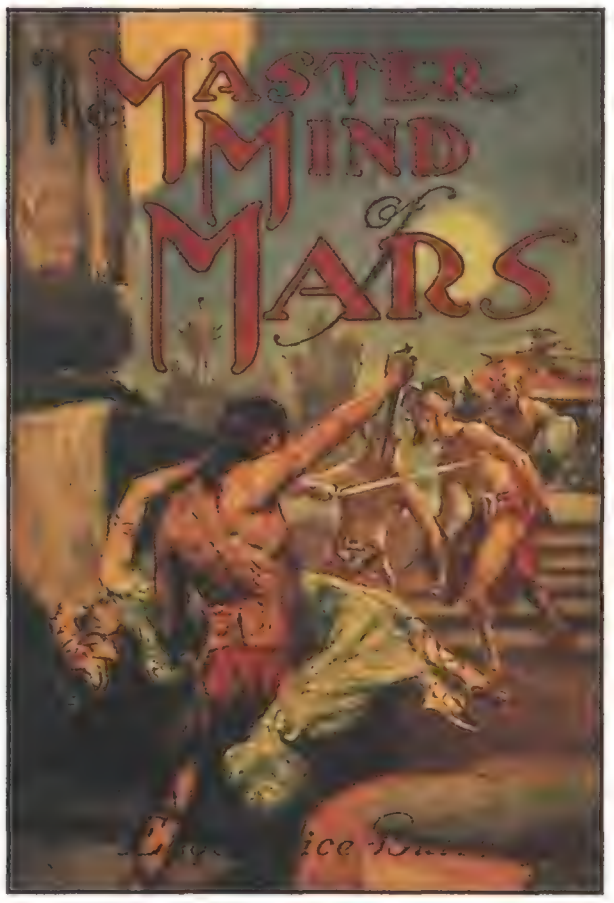


Opposite: Burroughs grandstanding at Tarzana in the 1920s. The modern Tarzan (from the top): Denny Miller, *Tarzan the Ape Man* (1959); Miles O'Keefe, *Tarzan the Ape Man* (1981); Christopher Lambert, *Greystoke: the Legend of Tarzan, Lord of the Apes* (1984); Casper Van Dien, *Tarzan and the Lost City* (1998); Mike Henry, *Tarzan and the Valley of Gold* (1966).

BURROUGHS MEMORIAL COLLECTION, UNIVERSITY OF LOUISVILLE LIBRARY (5)

one way to remain solvent. Write even more stories.

By night, Burroughs suffered thrashing nightmares, "when I would see figures standing beside my bed, usually shrouded." By day, he kept his imagination in check with steely self-discipline. In 1920 Tarzan serials were running in movie houses. Across America kids belonged to the Tribe of Tarzan and took the ape-man's pledge to "be truthful, honest, manly and courageous." And movies had introduced the ape-man to a worldwide audience. Burroughs, however, was sick of sequels. "If it wasn't for the lure of the filthy lucre I should never write another," he had told friends earlier. He slogged on, eventually writing,



A master of pulp fiction, Burroughs wrote 74 books, which sold more than 100 million copies, and became the most widely read American author of the early 20th century.

or dictating, 24 books about the lord of the apes, but his fatigue could be read between the lines.

As he groped for new plots, readers never knew who might drop in on the ape-man. A Chicago gangster, an Italian communist and various Russian spies turned up in his jungle. Such absurdity didn't bother readers riveted by the basic conflict between nature and nurture. Yet as Tarzan came upon another lost city or suffered another case of amnesia, the call of the wild began to sound like a drone. "Tarzan doesn't seem to be Tarzan any more," one editor noted. Burroughs had never considered his work literature, instead putting himself "in the same class with the aerial artist, the tap dancer, and the clown." Still, he despaired when his aerial artistry lost its balance. To get out of his rut, he dallied with writing screenplays, penned a novel about Hollywood and wrote westerns surprisingly sympathetic to Indians. Readers preferred his sequels. He could craft an entire planet out of words, yet he traveled there with the same baggage—cloned scenes of abduction, combat and coincidence.

Despite this, Burroughs sowed seeds of science fiction that grew throughout the century. Among his biggest fans was Ray Bradbury, whose *Martian Chronicles* took a later generation to the red planet. "In sum, we may have liked Verne and Wells and Kipling," Bradbury remembered, "but we loved, we adored, we went quite mad with Mr. Burroughs." *Star Trek* creator Gene Roddenberry likewise devoured Burroughs as a boy. And although the young George Lucas read mostly comic books, many *Star Wars* characters owe something to the princesses, odd races of aliens and swashbuckling young swordsmen of Barsoom.

Burroughs had long been a master marketer, skillfully peddling his stories in search of the highest price and the broadest rights. At his peak, he was earning about $100,000 a year, yet his huge ranch drained his pocketbook, and his financial affairs were complicated enough to require a corporation. A year after he incorporated in 1923, Burroughs left Tarzana for Hollywood. His ranch became a country club that went broke and left Burroughs heavily in debt. In the early years of the Depression, when he began publishing his own books, his sales slipped badly. Young escapists adored him, yet the public at large was losing interest. Then, in 1932, from deep in the jungle came the savage cry of a former Olympic swimmer. Burroughs had described Tarzan's yell as "his shrill cry of defiance." Johnny Weissmuller gave it a more primal and even ferocious rendering: "Aaayaaaeeeeeeeaaaeeaaaeeeaaah!"

Ever since Elmo Lincoln donned a lion skin, Burroughs had been looking for a better Tarzan. Through several movies, a variety of semi-clad hunks had swung through the trees. In 1932, with Tarzan slated to talk on-screen, Clark Gable and Joel McCrea were rejected for the role. Then the film's screenwriter spotted Weissmuller coming out of a pool at the Hollywood Athletic Club. Standing 6 foot 3 inches with the triangular torso that had won him five Olympic gold medals, Weissmuller seemed straight out of central casting. On the set, he complained that his dialogue "read like a backward two-year-old talking to his nurse." Despite the cliché, he never once said "Me Tarzan, you Jane." But cavorting in lagoons and tree houses, Weissmuller and Maureen O'Sullivan were the perfect primal couple. Enlivened by scenes shot in Africa for a previous film, MGM's *Tarzan the Ape Man* revived the

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fortunes of the king of the jungle and his creator. Shortly after its release, some theaters were running seven shows a day. MGM's follow-up, *Tarzan and His Mate*, was also a hit.

After divorcing Emma in 1934, he married a former actress half his age, flew his own plane and lived a bibulous life in Malibu and Palm Springs. Tarzan movies, Sunday funnies and merchandise, including Tarzan bread, ice cream, chewing gum and bathing suits, barely kept him out of debt. Burroughs produced his own radio show. An old man," he lamented. He spent his last five years in ill health, living in a small house bordering the burgeoning suburb of Tarzana. Burroughs died on March 19, 1950, apparently while reading a Tarzan comic.

In 1999 Disney's *Tarzan* reached a new generation of ape-man fans. Aping Burroughs himself, Disney is planning a sequel. In the past few decades, more than 40 fanzines, with names like *Tarzine* and *ERBania*, have been published. Tarzan is regularly deconstructed by professors

His shoulder sore from typing 400,000 words a year, Burroughs liked to relax with road trips through the countryside in his Cord automobile.

editor had once told him that pulp writers rarely lasted more than ten years. Burroughs had survived a generation, making his own life as much a daydream as his stories. Still, there was one fantasy he had yet to fulfill.

In December 1941 Burroughs was living in Hawaii, where he had moved to escape his Hollywood rut. Abandoned by his second wife, he suffered angina, but cheerfully wrote friends that Pearl Harbor was "one of the safest places under the flag." On the morning of December 7 he was playing tennis with his son Hulbert when explosions shattered the calm. At first, father and son thought it was just a drill, but smoke rising from the naval base told Burroughs that at last he had arrived at a fire before it was out. When World War II began, he tapped Tarzan's fame, becoming the nation's oldest war correspondent. Initially, he did little more than hobnob with soldiers happy to have a beer with the creator of Tarzan. Then, in 1944, United Press sent him to cover the Battle of Tarawa in the Pacific. Back home, in *Tarzan Triumphs*, the ape-man fought Nazis in his jungle. Weissmuller's grunt, "Now Tarzan make war!" brought cheers from wartime audiences. Meanwhile, Burroughs, pushing 70, traveled more than 15,000 miles by ship and air. Each mile took its toll. "I guess I ran up and down too many ship's ladders for an analyzing "The Tarzan Myth and Jung's Genesis of Self." And dictionaries note that the ape-man is now an archetype, defining a "Tarzan" as "a strong agile person of heroic proportions and bearing."

Asked to explain how he dreamed up Tarzan, Burroughs always hesitated. He admitted he owed something to Kipling's jungle boy, Mowgli, but gave more credit to those two boys raised by wolves, Romulus and Remus. Yet when asked why an ape-man became an enduring literary creation, Burroughs had a ready answer. Tarzan's appeal, he said, is escape. Escape from "the narrow confines of the city streets," escape from "the restrictions of man-made laws, and the inhibitions that society has placed upon us. We would each like to be Tarzan. At least I would; I admit it."

Frequent contributor Bruce Watson is at work on a book on A.C. Gilbert, the inventor of the Erector set, whom he profiled in May 1999.

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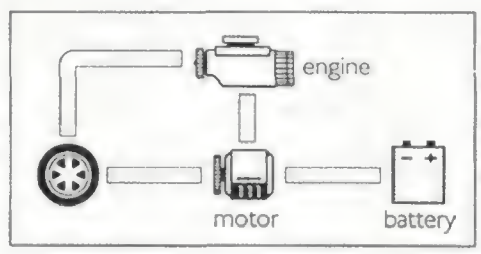

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THE RHINOS ARE BAAACK!

BY DOUG STEWART

IN SOUTH AFRICA THESE HEFTY, UNPREDICTABLE AND INQUISITIVE BEASTS ARE FLOURISHING AND HAVE BECOME VERY BIG BUSINESS

PHOTOGRAPHS BY JIM LEACHMAN

At the KwaZulu-Natal auction, a white rhino grazes in its boma, where buyers can take a close look from the catwalk above the holding pens.

THE BLACK RHINOCEROS STANDING AT THE EDGE OF THE CLEARING LOCKS EYES WITH ME AND STARES MALEVOLENTLY. Or it seems to—rhinos have poor eyesight. And they always look irritated, if not downright angry. "He's not in a good mood," David Bradfield whispers to me as we sit in an open Land Rover 50 yards away, watching the rotund young bull as he stamps his feet and exhales loudly through his nostrils. In the driver's seat, Riaan Pretorius starts up the engine, just in case. Bradfield and Pretorius work at the Lapalala Wilderness, a spectacular private wildlife reserve in South Africa with nearly one-eighth the land area of Rhode Island. Lapalala has dozens of wild rhinos, and the rangers know them all. This is Mapateng, an ornery 2-year-old who already weighs close to a ton. With an explosive snort, he bolts a few yards toward us in a mock charge, then turns and swaggers back to his ponderous two-ton mother, Punyane, who continues to browse.

Black rhinos are unpredictable beasts. When they charge, they often keep coming—and they're capable of covering 45 feet in one second. "I was watching a group of rhinos a few weeks ago," Pretorius says quietly as we study the animals, "when the wind changed." A large male put his head down and came straight for him. Pretorius quickly climbed the nearest tree. "I stayed up there and had a smoke," he says. (Treed humans can't always relax. A black rhino at the Hluhluwe reserve in KwaZulu-Natal Province used to reach into a tree's branches and try to hook people out with her front horn. The rangers there called her Poking Polly.)

People and rhinoceroses prefer similar habitat but don't mix very well, which is one reason rhinos have almost vanished from the earth. Outside Africa, rhinos have long had a potent, even mythical, reputation thanks to their imposing bulk and almost prehistoric appearance. A rhinoceros was paraded through Rome in 29 B.C. to celebrate Augustus' victory over Cleopatra's Egypt. Marco Polo thought they were unicorns. But newcomers moving into rhino country were often less admiring. Observing a large bull shot by his expedition in South Africa's Cape in 1801, William Somerville deemed it "beyond comparison the most awkward and ugly of quadrupeds." Since the 19th century, people have shot them for protection, for sport, for their horns—used in Asia for folk remedies and in Yemen for dagger handles. Before the close of the 20th century, the death toll was staggering.

Like the giant panda, the rhinoceros is now a worldwide symbol of endangered megafauna. Asia's three species of rhino—the Javan, Sumatran and Indian—cling to survival in a few protected refuges. Africa's two species—the black, or hook-lipped, rhinoceros (*Diceros bicornis*) and the white, or square-lipped, rhino (*Ceratotherium simum*)—have been killed off in one impoverished, land-hungry country after another. But here the story has a twist. In South Africa, rhinoceroses are flourishing. The country has two of the three significant populations of endangered black rhinos left in Africa and close to 90 percent of all the southern white rhinos remaining on the continent. The numbers of both are climbing year by year.

A key reason is game privatization. South Africans now buy, sell, breed and ship wild animals—white rhinos especially—as if they were racehorses or Pomeranians. Rural landowners are selling off their cattle, bringing in expensive game, and charging admission. The country's thousands of private reserves now account for three times as much conservation land as its expansive national parks. Some conservationists in the West tut-tut about the seeming crassness of it all, but South Africans just point to their game counts.

"In 1962 we had one breeding population of white rhinos in the whole of South Africa," says George Hughes, head of the KwaZulu-Natal Nature Conservation Service (KZN-NCS), whose breeding stock has fueled the white rhinos' comeback. "Today we have well over 250 breeding populations." Many of those, he says, are in private hands.

The Lapalala Wilderness, occupying a huge swath of

A black rhino shows off its flexible upper lip (above) used to reach for foliage to eat. A white rhino baby and its mother thrive on a private reserve near Kruger National Park.

ERWIN AND PEGGY BAUER

rugged bush veld in South Africa's remote Northern Province, is one of the most significant private sanctuaries for rhinos in the world. Dozens of white and black rhinos roam the enormous refuge, along with giraffes, zebra, hippos, Cape buffalo and antelope. The preserve was created in 1981 by a South African writer, Clive Walker, as a nonprofit tourism and education center with backing from a Cape Town businessman, Dale Parker. Walker is delighted so many private landowners have followed his lead.

"Everyone seems to be buying rhinos," he tells me as we huddle around a fire on a chilly night at one of Lapalala's rustic bush camps. "There are more than 10,000 white rhinos in private and government hands in this country now." The post-apartheid government has slashed its nature-conservation budget so it can pay for long-overlooked social needs. Yet to the surprise of pessimists, the number of rhinos in the country is growing, not diminishing—"in spite of the fact that it's now permissible to hunt white rhinos here." Walker, a still-dashing 64-year-old who's bagged a lion or two in his day, estimates that 45 to 50 white rhinos, typically older bulls, are shot by trophy hunters each year (none at Lapalala). Black rhinos remain off-limits. "Private enterprise now looks at the game industry as something worthwhile to get into," he says. "People are willing to pay more than $30,000 apiece for white rhinos. They are mostly buying them not for hunting but to breed them and sell the offspring at a profit, and for tourism. It's amazing how this has developed."

Early the next morning, I tag along on a foot patrol with Bradfield and Pretorius. Ahead of us on a high grassy plateau studded with flat-topped acacias and velvet bush willows, game trackers Andries Mokwena and Martiens Mpaga are following a set of fresh white rhino tracks. The white rhino is reputed to be less dangerous than the smaller black rhino, but only relatively. In the distance, herds of blue wildebeests and impalas graze. A lone kudu bull with gorgeously striped flanks and curlicuing horns watches us before bounding into the trees. As

As Kruger park veterinarian Douw Grobler pulls a blindfold over the eyes of a drugged white rhino, a game-capture team struggles to guide the bull toward a transfer crate.

we hike, all I can make out of the rhino's trail are the impressive, still-warm dung piles that punctuate it.

Then, almost casually, without a word, Mokwena and Mpaga crouch down in the tall grass. A short distance upwind, four white rhinos—a bull, a cow, and her calves—are placidly munching grass in a clearing. These are the largest land mammals on earth, aside from elephants and hippos, but their low-hanging bellies and scrawny tails remind me at first of a much smaller pachyderm, the pig. "That's Poacher," Bradfield whispers, pointing to the largest of the four. "He's one of our older bulls." With his blimplike girth and lethal-looking front horn, Poacher is an impressive specimen. On the black market, that horn alone could fetch $10,000, though it's nothing more than a tight bundle of fibers, similar in composition to a fingernail. (Claims for the rejuvenating powers of ground rhino horn are thus about as valid as believing that chewing your nails will make you live longer.)

"See his wide mouth?" Pretorius whispers to me. "That's different from the black rhino's. And the heads of these animals are much bigger." Both white and black rhinos, he says, are actually gray. White is probably a mistranslation of the Afrikaans *weit*, or wide, to describe the white rhino's low-hanging mouth, adapted for grazing. The black rhinos we saw earlier had smaller, higher heads and prehensile upper lips, which reminded me of a rudimentary elephant's trunk as they grabbed twigs and foliage rather than grass.

Now the foursome seem to get wind of us, literally. They stop grazing and stare suspiciously in our direction, their ears swiveling like radar dishes sweeping the horizon. A rhino's sense of smell, like its hearing, is acute—its nasal passages occupy more space than its brain does. With surprising agility for so hefty a beast, Poacher begins to pivot in place, his massive head helping counterbalance his hindquarters. As a full-grown rhino, he may lack natural predators, but he's skittish all the same. Abruptly, the animals move off at a trot. They somehow carry their bodies lightly as they move, their tails held high.

I glimpse scars on Poacher's back—wounds from a poacher's spear in Natal some years ago, says Bradfield. With better security in the past decade, he says as we head back to the Land Rover, poaching is not as dire a threat to South Africa's rhinos as it once was. A more likely killer of rhinos here is probably other rhinos. "If you have too many bulls, they're going to start killing each other," he says. A shy and serious-minded 29-year-old, Bradfield, like Pretorius, wears shorts and hiking boots in even near-freezing weather. As wildlife manager here, he has the responsibility of knowing where all the rhinos are and, if necessary, interceding if there's trouble—

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calling in a vet perhaps, or moving a troublemaker elsewhere. Doesn't a good wildlife manager, I ask, let nature take its course? Isn't Africa supposed to be wild?

"But is African wildlife natural?" Bradfield replies. "It's not anymore. We've got fences all over Africa, especially in South Africa." This very reserve, all 140 square miles of it, is fenced. In effect, the rhinos and other big game are all here by invitation. (Elephants, lions and spotted hyenas have not been invited.) Even Kruger National Park, Bradfield points out, a wildlife sanctuary the size of Israel, has an electrified fence around its entire perimeter. "These are not natural systems, so we have to control the animal populations inside them."

Indeed, game fences are ubiquitous in South Africa. Outside the dusty hamlet of Vaalwater, I stop at the Nyathi Ranch, one of many private game ranches in the region. The owner, a tough-talking Afrikaner named Martin Nagel, is about to hold a game auction in a barn out back. "Every year, game prices in South Africa break the previous year's record," he says, as we go out to watch an oversize tractor trailer unload a shipment of live giraffes, wildebeests and waterbuck. "The prices keep climbing." From a catwalk above two rows of roofed pens, I look down on an ark's worth of African wildlife, from antelope to zebra. All of it is for sale, from the nyala bulls with green ear tags and protective plastic tubing on their horns, to the pairs of giraffes circling restlessly in narrow pens like slow-moving two-bladed propellers. Nagel isn't selling rhinos today, he says apologetically, but he will next year. Lions too.

Outside the auction barn, I chat with a middle-aged couple, John and Val Thorp, who own a 6,000-acre ranch nearby. (For rural white landowners, that's fairly modest. For blacks, it's unimaginable. Though apartheid has formally ended, most blacks still live on communally owned tribal lands or in rented shacks in crowded black townships.) The Thorps already own seven white rhinos. "We just got chased by three of them yesterday, a mother, a father, and baby," Val tells me. "I shouldn't say 'chased.' They followed us, like a dog would. They're very inquisitive."

Giraffes, along with other African wildlife from antelope to zebra, are available at game auctions. Brandon Leer, auctioneer (center), leads the bidding at the huge KwaZulu-Natal sale. A white rhino bull (right) is off-loaded after capture and will be sold to the highest bidder.

Their neighbors Simon and Danielle Rood join us. "The warthog's pregnant again," Danielle announces. "We've never seen so many pigs," adds Simon.

"That's probably why the leopard's moved in," John says.

"That's the way it should be," says Simon, though the

old-time cattle ranchers don't yet agree, he adds. Leopards will keep the warthogs and impalas in check without troubling the larger game. These people may live in ranch houses, I realize, but suburbanites they're not. The Thorps are planning to build a new house inside their game fence so they can watch the rhinos from their picture window.

What with all the game fences that South Africans are erecting, livestock trucks have replaced migration as the usual mode of long-distance transport for wildlife. Catching and moving rhinos and other large, dangerous animals has become a precise, fast-moving, almost military-style operation involving lots of people and heavy equipment. On a cool winter morning in Kruger National Park recently, with patches of mist still blanketing the veld, I watch from the back of a crowded white pickup as a white rhino staggers into a clearing. A few minutes ago, veterinarian Douw Grobler, chief of Kruger's game-capture team, leaned out of a jet helicopter and fired an immobilizing dart into the bull's rump. The chopper now hovers just above the trees, herding the woozy animal toward the road before it drops.

Kruger is home to between 3,000 and 4,000 white and perhaps 500 black rhinos. Surplus animals are regularly trucked to uncrowded corners of the immense park or to other parks and private buyers. The darted bull I'm watching is one of four due to be rounded up this morning. Like a punch-drunk prizefighter, it's now swaying on its feet, shuffling and snorting. People and trucks begin moving in from all sides. With the bull still on its feet, Grobler, a gruff, stoop-shouldered man with an obvious air of authority, strolls up, retrieves his dart and pulls a large blindfold over its eyes. Then, with both hands, Grobler shoves the dazed creature over onto its big, rounded side.

The team goes to work—taking blood samples, setting ropes, readying a crate. As a long line of rangers prepares to heave on a line tied to the rhino's handy front horn, Grobler grabs a syringe with a fast-acting antidote. Drugging a rhinoceros is a tricky business. You want it groggy enough not to kill you, yet lively enough to do its own walking; even 20 rangers couldn't lift a full-grown rhino. Grobler jabs the bull behind the ear, and within a minute or two it starts to come around, hissing and panting under its blindfold. The boss of the rope-hauling chorus line calls out, "Right, if the rope goes, it's everyone for himself! Pick your vehicle." I edge toward the white pickup, but the

Conita Walker, who runs a rhino orphanage at Lapalala, gives local children an up-close and personal encounter with a 5-year-old white rhino named Munyane.

ropes hold, and within 20 minutes the bull is packed inside the steel crate, the crate winched onto a large flatbed truck, and the truck roaring down an asphalt road to the park's rhino boma, or holding pens. In a month or two, it will be snorting and wallowing behind someone else's game fence.

Amazingly, Kruger Park used to have no rhinos at all. In 1892, in fact, white rhinos were presumed to have disappeared from the planet altogether, victims not of poaching but of European hunters and land clearing. A few years later, a pocket of survivors was discovered in a valley between the Black and White Umfolozi rivers. The thousands of white rhinos in Africa today, including every one of Kruger's, trace their lineage to that remnant population. (Black rhinos, by contrast, were abundant into the 1960s. Then rampant poaching nearly exterminated them. From 100,000 in 1960, their numbers in Africa plummeted to barely 2,500 by 1992. Today, though still vulnerable, black rhinos have rebounded somewhat to just under 3,000.)

The wild patch of riverine bush veld where the white rhinos had hidden in the 1890s is today part of the Hluhluwe-Umfolozi Park game reserves, now teeming with rhinos and other big game. The KwaZulu-Natal Nature Conservation Service (née Natal Parks Board) has been selling the excess to the highest bidder since 1988. The annual KwaZulu-Natal Game Auction is the Kentucky Derby of wildlife sales, attracting high rollers and setting game-price records.

The day before the auction, prospective bidders window-shop the zoolike rhino bomas on a hilltop at Umfolozi. In the wooden-pole pens are more than 40 rhinos, white and black; hoof stock is cloistered at a separate locale. The rhinos here may be captive, but they're certainly not tame. The first black rhino I approach is exuding bad intentions. He immediately makes a mock charge, then backs up and charges me again. Not satisfied with that, he trots off into the main enclosure in back, spins in place, then hurtles straight at me from 30 feet, skidding to a stop with a loud burst of spray from both quivering nostrils, his horn jutting between the boma poles. This animal obviously wants not only to break out of this joint but to puncture me and anything else on two legs once he's out.

Or perhaps not, according to Louise Dainty, a confessed rhino lover who's here with her sister. She disputes the idea that this animal is essentially two tons of anger. "Yesterday I scratched his head," she says delightedly. She demonstrates how she'd cooed to him in a quiet voice. "And he went, 'Hmm? Hmm?' as though he were speaking to me. He came right up, and I scratched his little head!" Indeed, one of the oddities of black rhino behavior, experts say, is that their fierceness in the wild can be offset by a calmness in captivity. Even Poking Polly was a pussycat when confined.

People move up and down the rows of pens, scribbling on their auction lists like bettors marking up racing forms. One of them is Mike Englezakis, who owns the Thabana Safari Lodge near the Botswana border. The lodge hosts ecotourists part of the year, hunters at other times. Well-dressed and blunt-talking, Englezakis makes no apologies for his belief that South African wildlife, including white rhinos, is a consumable good. "The world has millions of cattle, pigs and chickens," he says, "for only one reason: because we raise them in order to eat them." Trying to protect Africa's wildlife by sequestering it on public land won't work, he says. "Human needs will always come first, for better or worse. The minute there is no more grazing for my cow, the wildebeest must die, because it doesn't belong to anyone. The cow is mine, it's worth money, so I've got to protect it." By putting a price tag on a rhino, a zebra, or a kudu, he says, so that people can own it and make money from it—dead or alive—the species is suddenly worth cultivating. "For wildlife to survive," he concludes almost fiercely, "it has to become a cow."

The next day's auction once again set a record, earning the parks agency more than 15 million rand or about two million much-needed dollars. The six black rhinos, destined to be stars at a new tourist safari park in the

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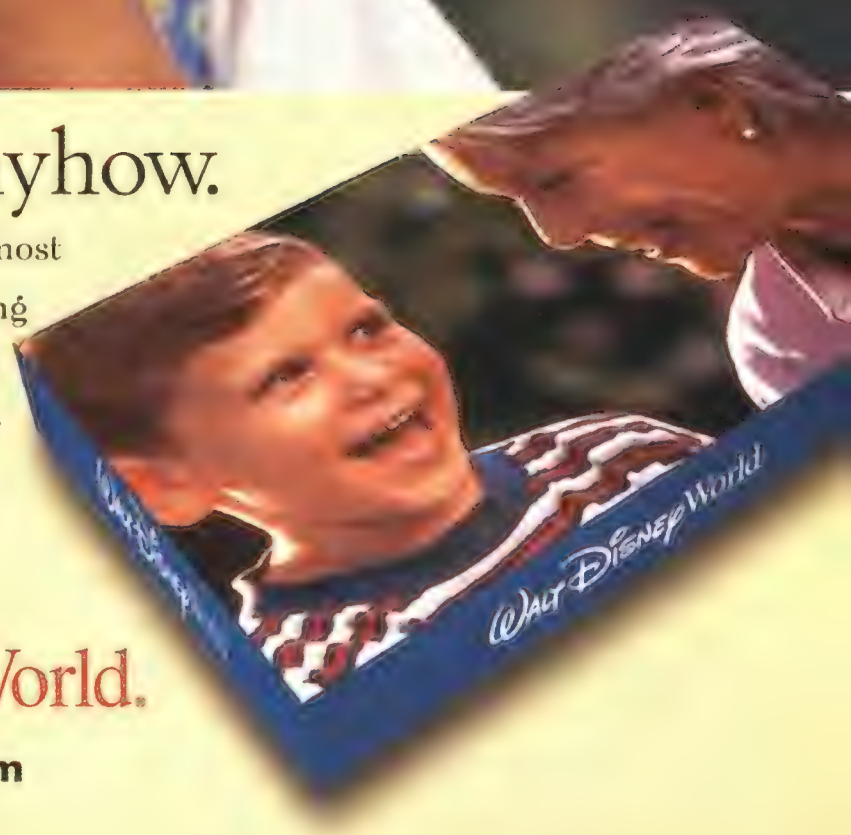

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White rhinos are plentiful on John Hume's ranch, where he introduced "green hunting." Hunters shoot specific rhinos with dart guns so the animals can be examined or transferred.

Eastern Cape, account for more than $300,000 of that.

Even the booming market for rhinos, however, doesn't guarantee their future in South Africa. One of the game industry's weaknesses is that it's a white man's business. "For local black communities, game conservation so far hasn't given many tangible benefits other than jobs," says Khulani Mkhize, the KZN-NCS's new acting CEO. Owning a piece of a new tourist camp or restaurant could pay off in the long run, he says, "but where do they get the money to buy equity in these businesses?"

In the new democratic South Africa, if conservation continues to be a game for the white elite, the safety of rhino sanctuaries, public and private, can never be ensured. "Our game reserves remain fortified areas with highly trained guards carrying automatic weapons," says Lawrence Anthony, a Natal conservationist. "The reason is the demand for land by impoverished rural communities next to them." Many public reserves sit on traditional lands, he says. The apartheid government would proclaim a park and expel the inhabitants. Today many communities want to get their land back. "They've got good memories," Anthony says. "They know exactly where the traditional boundaries are."

A return to subsistence farming and cattle grazing inside the parks would, of course, be an ecological disaster. Instead, Anthony has been working in partnership with several tribal communities on the edge of the Hluhluwe and Umfolozi parks to establish an adjoining Royal Zulu Game Reserve. Anthony hopes the reserve, which would rival Lapalala in size, will once again be home to hundreds of white and black rhinos.

Nokwethemba Biyela, a leader of the Biyela tribe, is a driving force behind the new reserve. She has brought local people (most of whom had never seen a live rhino) to visit the Umfolozi reserve. "Ten years ago, if a black person visited a game park in South Africa," she says, "it was like he was trespassing." Small wonder many blacks have mistrusted wildlife authorities more than poachers.

Says Anthony, "If we involve these people in building their own game reserves and they start benefiting, we'll protect the rhinos. I don't see another way to do it."

Contributor Doug Stewart lives in rhino-free New England. Jim Leachman photographed an elephant orphanage in Kenya for SMITHSONIAN *in the March 1997 issue.*

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NOISE Busters

BY RICHARD & JOYCE WOLKOMIR

TO DISSECT THE DIN THAT DAILY ASSAULTS OUR EARS, RESEARCHERS FROM THE NOISE POLLUTION CLEARINGHOUSE ARE TAKING TO THE STREETS

In Manhattan, clearinghouse director Les Blomberg (far left) wields a meter to measure decibel levels. At the center's Vermont headquarters, a bulletin board (left) displays correspondence, punctuated by an image of Munch's *The Scream*.

PHOTOGRAPHS BY RICHARD HOWARD

"SECRET LABORATORY OF DR. DECIBEL," READS THE HAND-LETTERED SIGN TAPED TO LES Blomberg's office door at the Noise Pollution Clearinghouse, in Montpelier, Vermont. It was inspired by a Boston friend's telephone call, suggesting the organization create its own comic book superhero. College and high school interns put up the sign. Blomberg, the nonprofit organization's director, was inside his office at the time, oblivious to the tittering outside because he was fine-tuning sound levels on a CD recording he had made—ultra-large dump trucks, construction-site air compressors, jackhammers, that sort of thing. Blomberg's CDs go to noise-beset citizens so they can show officials their precise daily dose of acoustical irritant.

Combating noise is not the usual cartoon-hero derring-do. But in our society noise often is a protected monster. Regulations may be weak. Or noisemakers argue quieting down would be too costly. Sufferers desperately searching the Internet stumble upon the clearinghouse's site, www.nonoise.org. They call or write or e-mail—"I am writing to you at 2:30 A.M. because I was awakened by leaf blowers and I am so angry . . . " "I am dealing with a large lumber company which installed a new drying kiln a few months ago, and operates it 24 hours a day, 7 days a week. I live in a very rural area . . . " "Recently the level of airplane traffic over our home has increased to an intolerable level. I have become depressed . . . " "Now, the interstate has a constant roar that comes toward the school. We can't teach outside. The children seem to have trouble with attention. They also seem to be agitated all the time . . . " "Over the past four months our home has been assaulted by the throbbing bass of our downstairs neighbor's stereo. Asking, pleading, and mediation have not worked . . . "

Noise becomes really annoying at about the 55 to 65 decibel range. And every 10-decibel increase represents a doubling of the loudness.

The clearinghouse responds with data and noise-fighting information, such as how to approach officials, or how to organize a neighborhood. To the beleaguered, it seems as if a buff dude in blue tights flew in, red cape billowing. A typical reaction: "Just to know that someone has taken the time to do research such as this allows me to feel not so alone." So think of Les Blomberg as the brainy, physics-savvy, but vincible, protector of the noise oppressed. Think of him as that limited-budget battler of rogue sound waves, Dr. Decibel!

Right now our superhero is standing at the corner of Lexington Avenue and 42nd Street, in Manhattan, aiming what looks like a TV remote control toward the Chrysler Building, more or less. It is smoggy and humid this afternoon, and wilted New Yorkers hurry by oblivious to Blomberg, although the sound meter he holds looks like, maybe, a detonator—hey, this is New York. And Blomberg, who is 39, his remaining dark-brown hair pulled back in a ponytail, wearing a pine-green shirt, khaki trousers and hiking boots, looks unthreatening. In fact, his trimmed beard and mustache frame an engaging grin that expresses the good-natured exuberance normally associated with, say, a Labrador retriever. He adjusts a knob as a corrections department bus with prisoners inside whooshes by, then peers appraisingly at a dial.

"OK, that was 78 decibels," he announces. Noise, most people find, becomes really annoying, he says, at about 55 to 65 decibels. Every 10-decibel increase represents a doubling of the loudness. So this Manhattan corner's loudness is four times the annoying level, a real pain in the tympanum.

Blomberg is counting decibels today in the city that is arguably our national noise-pollution capital. This corner's 78 decibels, for instance, makes it louder than most alarm clocks. But now a moving van's driver hits the brakes. Blomberg checks his meter: "That's over 90 decibels." It is like putting your ear next to an exceptionally loud vacuum cleaner. To be heard above the corner's engine whine and hissing air brakes and bicycle-tire hum and siren whoops, Blomberg finds he is compelled to raise his voice.

"We advise people every day, but usually from afar, so it's incredibly valuable to visit these people and experience their problems," he yells, somehow maintaining his benevolent grin. "Let's get on the subway downtown—I have to check on a new kind of noise pollution that we are calling Internet Buzz."

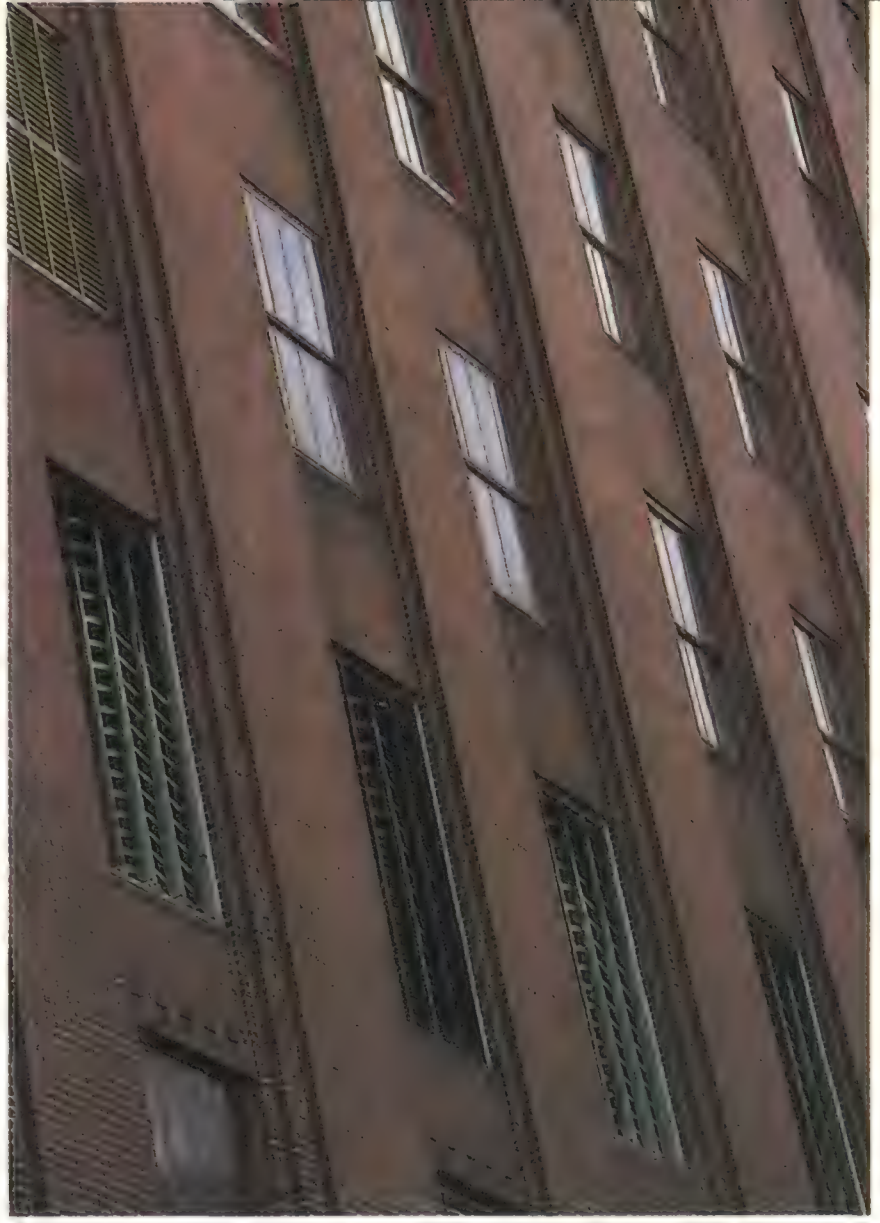
As the 7th Avenue Express rattles southward through its tunnel, Blomberg, hanging onto a metal strap, switch-

Psychologist Arline Bronzaft, right rear, chose P.S. 98, still located adjacent to elevated tracks today, as a site for noise research.

es on his sound meter with his free hand. "It's 80 decibels, just riding along in here," he says. A passing train registers 85 decibels: sustained exposure at that level, he says, can induce hearing loss.

Blomberg can cite lots of unsettling noise data. According to the U.S. census, for instance, Americans' number one neighborhood complaint—above crime, traffic and poor public services—is noise. Every day more than 138 million Americans experience noise levels the U.S. Environmental Protection Agency (EPA) rates as annoying and disruptive. Among city dwelling Americans, 87 percent are exposed to noise so loud it has the potential to degrade hearing capacity over time. But you will not necessarily find peace in the suburbs or countryside either, not with the onslaught of leaf blowers, snow blowers, lawn mowers, chain saws, snowmobiles, powerboats and all-terrain vehicles. Because of airplane and helicopter overflights, the natural quiet is now preserved in only 7 percent of Arizona's Grand Canyon National Park and nowhere in Hawaii's Volcanoes National Park.

Meanwhile, researchers have demonstrated that noise can raise your blood pressure and change your blood chemistry. For instance, adrenaline levels can rise, indicating the imposition of stress. Noise is also the leading cause of hearing loss: in the United States, exposure to excessive noise has made some 10 million of us at least a little deaf.



Tom Bernardin displays earplugs he uses to fend off noise, such as the roar from computer-cooling vents (grated windows, right).

"Noise is unwanted sound," Blomberg points out. "And 'noise' comes from the Latin word for 'nausea.'"

Most sources of annoying noise are increasing. Blomberg cites recent U.S. Department of Transportation statistics. For instance, according to certain calculations, in 1997 personal automobile traffic was 360 percent of 1960 levels, and large truck traffic was 430 percent. Airliner travel in 1998 was 600 percent of 1960 levels, and air cargo was up a whopping 2,460 percent. Meanwhile, Blomberg says, we have new noise sources: "In 1960 there were no boom boxes, no boom cars, no leaf blowers, no jet skis, no car alarms and hardly any snowmobiles."

Vanished noise sources? "I can only think of the doorman's whistle," says Blomberg. America's revulsion with its own increasing racket, he says, led to his organization's founding in 1996, funded by such contributors as the Rockefeller Family Fund.

Blomberg exits the subway in lower Manhattan in his guise as Dr. Decibel, armed with a high-tech sound meter. "But I have to be Miss Manners too," he maintains. That is because he sees two underlying noise-pollution issues: "Sovereignty—who owns the air? And civility—how do we treat our neighbors?"

Internet Buzz straddles both issues. Blomberg strides along Hudson Street to a salmon-colored building. Last night he camped in an apartment facing this building to measure how much of its noise assaults neighbors. He also plotted strategy with neighborhood residents and their attorney, because this building emits a constant buzz.

"See, on the first and fourth floors, every window has been replaced by vents, all making noise," Blomberg says, aiming his sound meter. Inside the building, telecommunications multinationals and dot.coms have installed computers that control their operations. Each computer room requires a big cooling unit, which is blowing its exhaust—and its buzz—out the window. "It's 70 decibels here on the sidewalk, and that's how loud it is outside the apartments across the street, all day, all night," observes Blomberg. A normal home reading is about 25 decibels.

City ordinances are unclear. Do proscribed noise levels apply to individual cooling units? Or do they apply to the building's collective noise? Also, the banned decibel levels vary according to the sound's frequency. "People say, give me one number and tell me if it's a violation or not, but regulations often have variable numbers and different scales, and the complexity hinders enforcement," Blomberg notes. "Yet, if you had just one decibel level, you might have a buzz below that number, legal, but still unbearable."

Blomberg and his $10,000 noise meters are helping Hudson Street dwellers decide whom to file complaints against: Firms leasing space inside the building? Or the building's owners?

Next stop: the 7th Avenue and 14th Street apartment of author Tom Bernardin (*The Ellis Island Immigrant Cookbook*), founder of Friends Against Noisy New York

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(FANNY). Yesterday Blomberg affixed sound meters to the facade of Bernardin's building to record 24 hours of New York noise. Now he peers at the digital readouts as Bernardin looks on. "The background here is 73.3 decibels," Blomberg says. That is about the level of a ringing telephone. Blomberg's meter has stored 24 hours of data in its built-in computer, both background noise and loud spikes. "Here's a spike of 104 decibels at 2:30 A.M., probably a siren or car alarm," Blomberg points out. "Here's one off my screen, louder than 110 decibels!"

Bernardin, who buys earplugs by the boxful, will present Blomberg's data to city officials. He wants to convince them to begin noise-cutting steps. For instance, the city could specify quieter buses. Blomberg notes that in Europe, trucks and buses can be only half as loud as vehicles conforming to U.S. regulations. Next on the agenda, he adds, should be noise limits for air conditioners. "If the background din dropped, police cruisers and fire trucks and ambulances wouldn't need such loud sirens," he says.

Bernardin, a former teacher who was a National Park Service guide at Ellis Island, where he relished the silence, gazes sadly out his windows at the Greenwich Village traffic roaring by. "This apartment has wraparound sound," he laments. In a guidebook, he finds a reference to an early 1900s socialite who founded the Society for the Suppression of Unnecessary Noise. "That was almost a century ago," he muses. "And the unnecessary noise is still unsuppressed."

Walking to a meeting, Blomberg and Bernardin spot a blue-suited executive clasping his hands over his ears. "Even in a wealthy neighborhood, we're creating acoustical slums," Blomberg says. Bernardin points out drivers operating remote car-door openers, making their cars toot. But here is a hitherto undiscovered noise source: a trailer truck offering curbside document shredding, accomplished via a churning and a thumping. "That's over 90 decibels," Blomberg announces. "It's louder than a . . . " But the churning drowns him out.

They arrive at the restaurant designated for the meeting Blomberg calls a New York Anti-Noise Summit. Economist Charles Komanoff, who coauthored a Noise Pollution Clearinghouse study on jet ski noise, reports he recently asked an audience: Noise pollution, or air pollution, from cars—if you could get rid of only one, which would it be? "A majority said noise," he says. "In my analyses, the costs from automobile air pollution are higher, but people are more bothered by noise from cars."

Also at the meeting is noise-consultant Arline Bronzaft, professor emerita of psychology at City University of New York and an adviser to the city's League of the Hard of Hearing. She authored a groundbreaking study on noise's impact on children's learning.

Bronzaft, appointed by the mayor's office to a committee on transit complaints, decided to test a public school next to the elevated train tracks at 212th Street and Broadway. "A train went by for 30 seconds every 4.5 minutes; the noise level in classrooms on that side of the building reached 89 decibels," Bronzaft recalls. By the sixth grade, students in these noisy classrooms, demographically identical to students on the school's opposite—quiet—side, lagged a year in reading ability. Bronzaft's report prompted the installation of noise-hushing rubber pads on tracks by the school and acoustical ceilings inside. Result: noise inside the affected classrooms was reduced by 6 to 8 decibels. "When we did the study again, to my great surprise and happiness, the children were all reading at the same level," reports Bronzaft. (Today noise levels at P.S. 98 again present problems: the trains, older by more than 20 years, have grown creakier, and noisier, over time.)

Specialists who trek to remote sites to record phenomena such as birdcalls report that not even the North Pole or the Amazon is free of unnatural noise.

Two hot issues are on this meeting's agenda—Internet Buzz and proposed new federal airport noise policy. The discussion becomes—is it fair to say?—noisy.

A few hours later, en route to Grand Central Station and his train home, Les Blomberg stops for a soda. In mid-quaff, he says: "Make noise unto others as you would have others make noise unto you!"

Even if the Noise Pollution Clearinghouse's three full-time staff members, and five part-time workers, and assorted interns, and all the noise-troubled people who call for help, actually wanted to move to a deserted area, they would be out of luck. Specialists who trek to remote sites to record birdcalls and other natural sounds report that not even the North Pole or Antarctica or the Amazon is now free of unnatural noise, such as the roar of airliners or the buzz of chain saws.

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Daimon Meeh, 14, corresponded with the governor to protest speedway noise near his New Hampshire farmhouse.

Les Blomberg, born in 1961, grew up in the suburbs of St. Paul, Minnesota, where his parents owned grocery stores. In high school, he recollects, he took "boom box speakers outside to entertain myself. I wasn't overly polite," he confesses. "I was a teenage boy, which shows there is hope, that people can learn."

He completed a degree in mathematics at the University of Minnesota and went on, graduating in 1993 from the University of Colorado with a master's degree in environmental ethics. In 1994 he and his partner, Brenda Hausauer, took on a joint assignment for the State of Vermont, writing a state energy plan. They were living in a downtown apartment in Vermont's tiny capital when Blomberg became a noise activist.

On many a morning at 4:00, down Blomberg's narrow lane, the town's solitary street sweeper roared. Blomberg campaigned to convince officials that a city of 8,000 did not need wee-hours downtown mechanized street sweeping. Marshaling volunteers, he proved brooms outperformed the machine. Finally—the clincher—he offered to record the downtown sweeper's noise and, at the appropriate hour, precisely reproduce it outside the officials' suburban homes.

News of Blomberg's work reached Harriet Barlow, director of the Blue Mountain Center, an artists' retreat in New York's Adirondack Mountains. She disliked noise. With a $50,000 grant, she started the Noise Pollution Clearinghouse. And she decided that Blomberg, trained in mathematics, physics and environmental philosophy, was just the fellow to head the new organization.

Dawn on Nantucket Island. Les Blomberg stands on a lawn, aiming his sound meter toward the Atlantic. He stands among gray saltbox cottages, some dating to the 1600s, buried in blue hydrangeas and yellow sunflowers, pink roses growing over their roofs. Nantucket is 16 miles long and about 6 miles wide, bigger than Manhattan. But its population is only 9,000, expanding to 60,000 in the summer. Noise? There is the ocean's rhythmic whoosh. Song sparrows. Goldfinches. Mourning doves. "OK," Blomberg says. "Here comes the first one."

At 6:03 A.M. an airplane flies over. "That's 58.4 decibels," Blomberg reports. At 6:07 A.M. another plane flies over, and another at 6:11 and again at 6:12, and at 6:16, 6:17, 6:18 . . .

Later, Blomberg drives to the epidemic's source, the island's little airport, with his host, Wade Greene, formerly a *New York Times Magazine* editor, now an environmental consultant to philanthropies. Greene also operates Wade Cottages, a vacation compound he created from his grandfather's summer home. He believes that airplane noise is going to hurt Nantucket tourism. Island stays are expensive. Vacationers value quiet. So do those who can afford a summer place here, where houses average $750,000 or more.

"Mainly we're dealing with two-engine Cessna 402 shuttle planes that fly to Hyannis, but there are private planes, too, and corporate jets," Greene is explaining. He points out a parked pickup's bumper sticker: "It Used To Be Nicer In Nantucket." Right now 26 airplanes are taxiing or waiting. Their noise is, literally, deafening. "You can get to this island only by ferry or by plane, and air traffic here is doubling every five years," says Greene. "This little airport is now the second busiest in all of New England, and sometimes the island of Nantucket has more flights coming and going than Boston's Logan Airport."

Blomberg is here to study Nantucket's noise dilemma. Greene contends many pilots ignore an agreement to fly one mile offshore. Blomberg shrugs. He calculates one mile is not enough: the planes should fly five to ten miles out.

Usually people affected by airliner noise have little political clout, Blomberg observes. "But here you can actually talk with aviation officials, and here the solution is simple—push the airplanes out to sea." He maintains: "If you can't do it on Nantucket, no place can do it."

Blomberg has also investigated the plight of the noise-beset residents of Loudon, New Hampshire. Today he sets up his equipment on a tripod in an immaculately kept gray ranch house's macadam driveway. "That's 78 decibels," he announces. Tom Early, the house's owner, a retired airline pilot, gray haired and gray mustached, looks on glumly. From his driveway you can see only his precisely trimmed lawn and white birches and one other home. But the roar from the New Hampshire International Speedway, a stock-car racetrack, seems to blot out everything. "That just hit 82 decibels," Les Blomberg says, eyeing his instruments. He notes that a typical city noise restriction for daytime is about 60 decibels, more than four times quieter. "At night they'll have rock bands," Tom Early says, shaking his head. "Louder than hell. And they have fireworks. And they fire off cannons."

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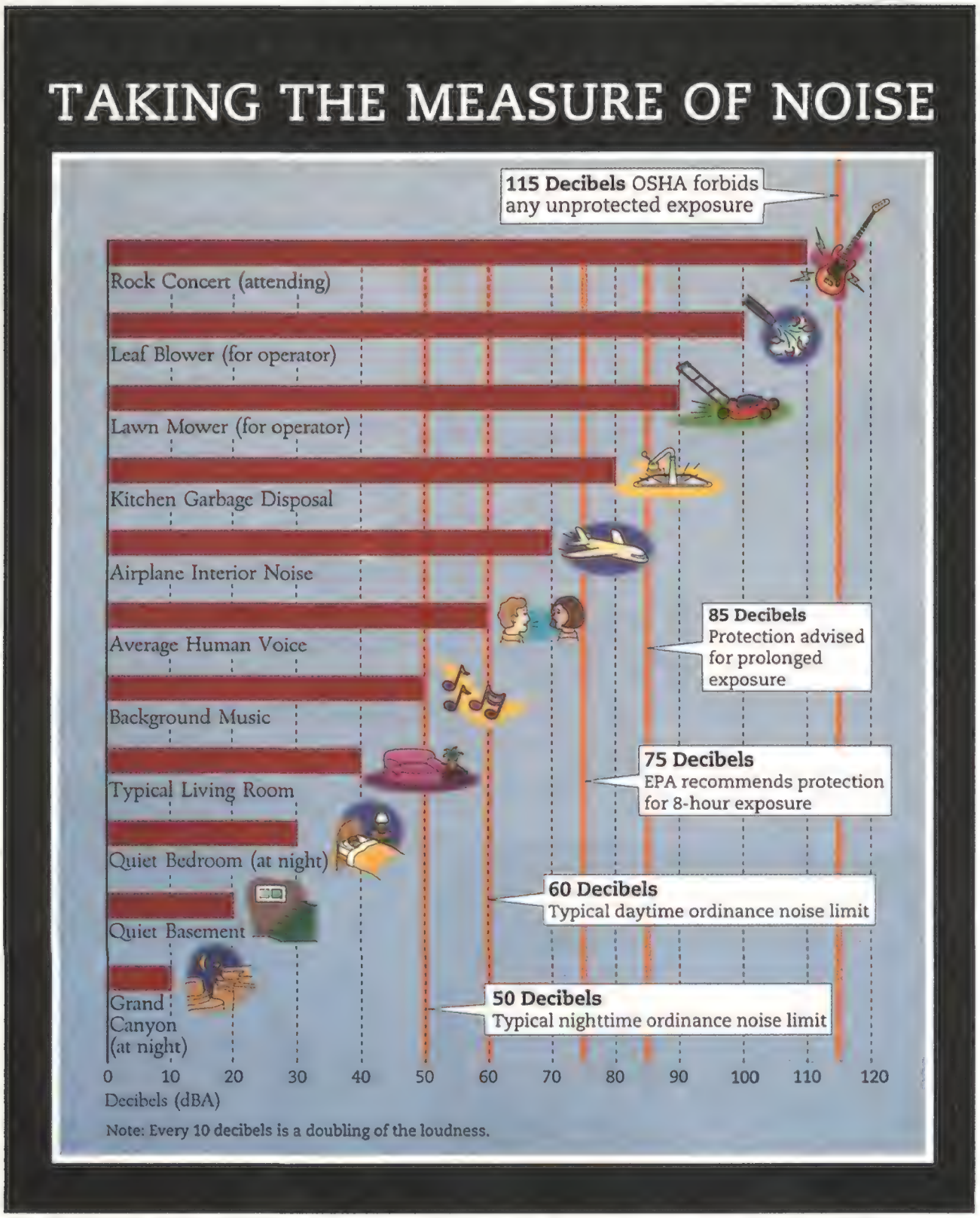
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Quiet Bedroom (at night)
60 Decibels Typical daytime ordinance noise limit
Quiet Basement
Grand Canyon (at night)
50 Decibels Typical nighttime ordinance noise limit
0 10 20 30 40 50 60 70 80 90 100 110 120
Decibels (dBA)
Note: Every 10 decibels is a doubling of the loudness.

From the deep stillness of the Grand Canyon to the ear-assaulting din of a rock concert, a complex range of sounds underlies our everyday experience.

Mufflers might be a solution. But Blomberg believes the real issue is that noise can increase the secretion of adrenaline in humans, perhaps because our distant ancestors associated loud sounds, like a lion's roar or a baby's scream, with danger. The greater the sound, the greater the adrenaline rush. Blomberg theorizes that racetracks prefer to be as loud as possible because it excites the fans. "That's why exercise classes crank up the decibels, and rock bands, and action movies," he observes. "In effect, noise becomes a drug they're pumping out and into you."

Later, Blomberg visits Daimon Meeh, 14, who shows him a letter he sent to New Hampshire's governor, along with a CD recording he made just outside his farmhouse of the racetrack's roar. "I don't remember a time when I didn't have to listen to the noise of New Hampshire International Speedway (NHIS) in Loudon," Daimon wrote, noting the track's growth: "As the noise of the racetrack grew increasingly louder, people in my town got more and more annoyed." He analyzed for the governor the noise's steady increase over the years and the economic effects. Despite his efforts, a solution has not yet been achieved.

Letters to the governor seem to be in the air. Stopping back at Tom Early's house, Blomberg finds the retired airline pilot irritated. "I'm just sending a letter off to the governor, and I told her I vote too," Early says. "Last night we were in here with the windows closed, trying to watch *My Fair Lady* on TV, and sometimes we couldn't hear it because the noise from the track was so loud."

When the Noise Pollution Clearinghouse's communications director, attorney Vicky Parra Tebbetts, checks the e-mail, mainly she finds messages like this: "Finally a thread of hope! Thank you so much for your help!" Or a New Jersey mayor seeks assistance deciding about 120-decibel alarms the volunteer fire company has set up in residential neighborhoods. From Japan comes a request for help—U.S. fighters flying low over Hiroshima suburbs. A musician writes from Hawaii: "It's the worst of situations—here in paradise! Five days a week we pay 2 gardeners to use an artillery of weed-wackers, lawn mowers and blowers, powered saws etc. to drive us nuts." From California, the Hollywood Heights Association seeks help dealing with news helicopters hovering overhead during movie premieres. And there is this: "We have been battling a neighborhood noise bully who has about 250 roosters on his 2 acre lot." As mottoes go, the watchword adopted by the clearinghouse seems benign: "Good Neighbors Keep Their Noise To Themselves."

Richard and Joyce Wolkomir write from the peace and quiet of Vermont. Richard Howard is based in Winchester, Massachusetts.

JEAN WISENBAUGH/LINDGREN & SMITH

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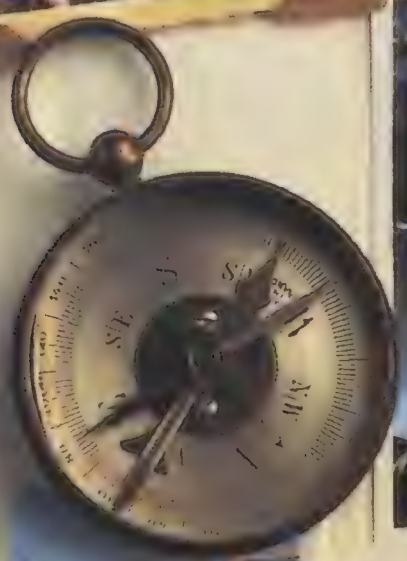

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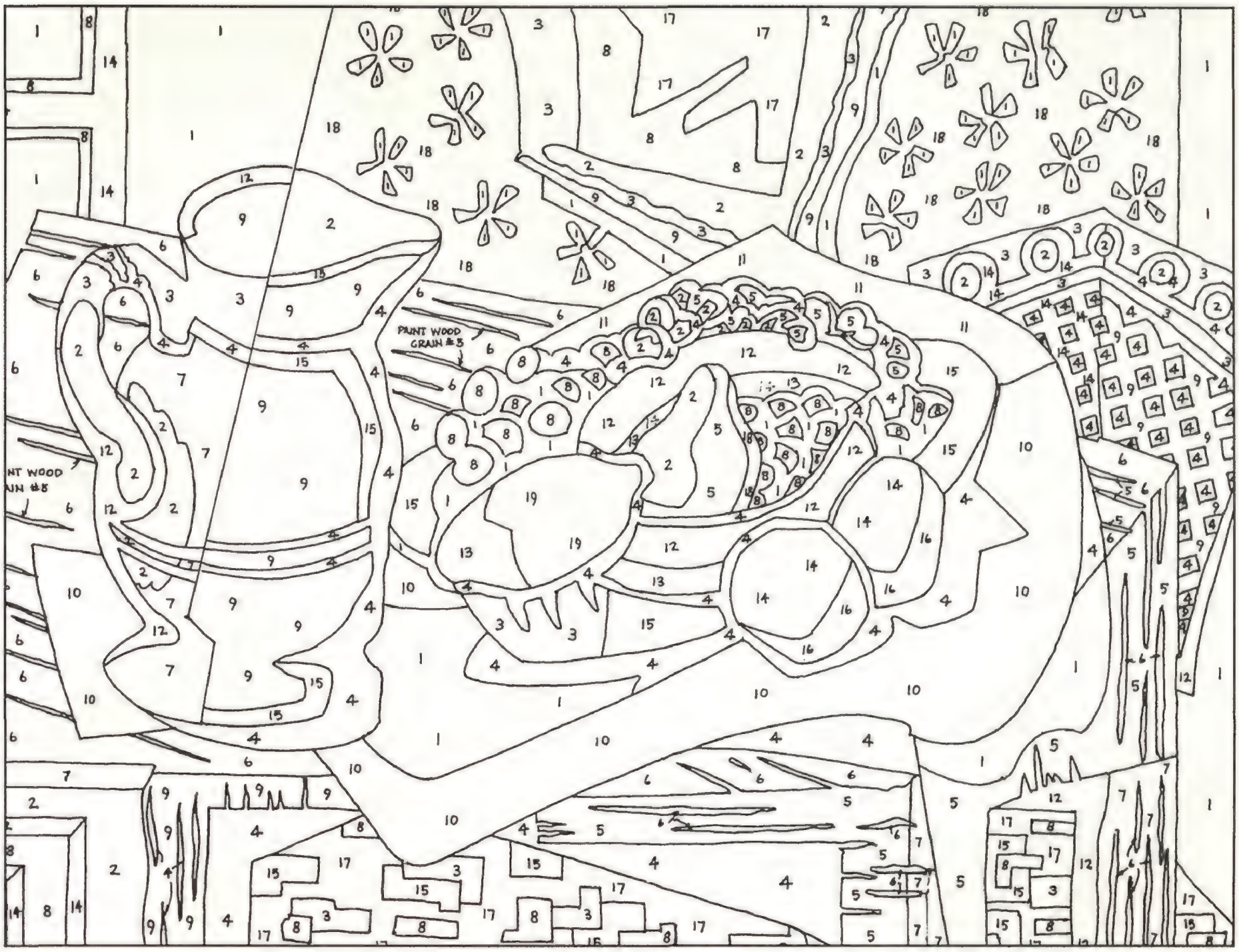
THE 1950S PAINT-BY-NUMBER CRAZE TURNED EVERYONE INTO AN INSTANT ARTIST. CRITICS WERE CONTEMPTUOUS, BUT EVEN THE PRESIDENT'S MEN WERE DOING IT



"I DON'T KNOW WHAT AMERICA IS COMING TO when thousands of people, many of them adults, are willing to be regimented into brushing paint on a jig-saw miscellany of dictated shapes and all by rote," wrote one concerned correspondent to *American Artist* in 1953. "Can't you rescue some of these souls—or should I say 'morons'?—before they are lost forever?"

Perhaps paint-by-number fans will soon be avenged. A new exhibition, "Paint by Number: Accounting for Taste in the 1950s," opens April 6 at the National Museum of American History and revisits the popular hobby from the vantage point of its critics, the artists and entrepreneurs who created the paint kits, and the hobbyists who willingly filled them in and hung them in their homes. Despite their detractors, by 1954 more "number paintings" were hanging in American homes than original works of art. It seemed as if the whole country was doing it. Even several members of the Eisenhower Administration had done kits. Apparently Thomas E. Stephens, the President's appointment secretary, managed to convince them that Eisenhower, an avid amateur painter, required it. The payoff: a West Wing gallery of paint-by-number subjects completed by officials such as J. Edgar Hoover and Nelson Rockefeller.

As hobbyists who negotiated the undulating blue outline of the numbered canvas knew, it wasn't art. But as millions of Americans picked up paint brushes for the first time, more than a few took liberties. They ventured off into, as one retailer put it, "paint WITHOUT numbers." The show suggests that the moment hobbyists ignored the prescribed outlines to blend adjacent colors, added or dropped details, elaborated upon themes, and extended the composition onto the frame, it was art. Morons, indeed. —*William L. Bird, Jr.*

The original oil painting, *Abstract No. One* (opposite) by artist Dan Robbins, was the prototype for the paint-by-number line art (above). In 1952 a now-unknown hobbyist entered his completed version in a San Francisco amateur art contest. It won third prize. When it was revealed to be the product of a paint-by-number kit, the judges were too embarrassed to comment.

While the kit for the modernist-style *Abstract No. One* proved unpopular with most hobbyists, kits for representational artworks were more appealing. Some of the best-selling subjects were (clockwise from top): great masterpieces such as *The Last Supper*, designed by artist Adam Grant after Leonardo da Vinci, which was the single most successful kit; portraits of sports figures like Larry Doby, the Cleveland Indians outfielder and first African-American ballplayer in the American League; and landscapes and seascapes such as *Conflict of the Sea*, which, after being completed, was mounted by its proud painter in an ornate frame.

PEGGY GRANT; TREY SPEEGLE; ROGER BRUNS; PP. 100-101 DAN ROBBINS (2)

Paint by numbers was marketed as a hobby for the home decorator and as a creative way to relax, and for a time it was all the rage. But a cadre of elite critics characterized it as "numbers nonsense," "a creative dead end" and as ruining "the soul of man." Even so, at the height of the hobby's popularity in 1954, the White House had a gallery of paint-by-number pictures in the corridor just outside the Cabinet room. Ironically, by the 1960s, the craze that had so enraged art critics was appropriated by pop artist Andy Warhol. Clockwise from top left: *Swiss Village* was meticulously painted by FBI director J. Edgar Hoover and hung in the White House, as was *The Old Mill*, which was completed and signed by Ethel Merman. Borrowing from the hobby, Andy Warhol projected by-the-numbers line art onto a large canvas and then added the numbers to create *Do-It-Yourself (Seascape)*, in 1963.

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THE MAGIC OF *Madame Alexander* DOLLS

BY JERE VAN DYK

IN HARLEM, NEAR THE HUDSON RIVER AT 131st Street and Broadway, is an old red-brick and stone building with white trim and a blue awning above the entrance. It is the home of the Alexander Doll Company, the last major manufacturer of hand-crafted dolls in the United States and the largest private, for-profit employer in Harlem. This is a quiet part of upper Manhattan, but inside the factory it is bustling as nearly 400 men and women work at cutting tables, sewing machines, foot presses, pleating machines, design tables and ironing boards, busily creating dolls. The floors are blue, the walls are blue and pink, and the language of the workers is primarily Spanish.

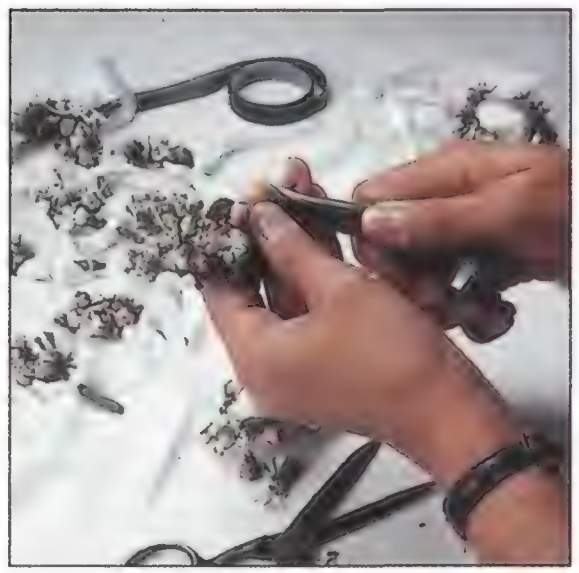
"We could move this factory to Asia tomorrow," says CEO Herb Brown during an interview in his office, "and indeed, we've recently started manufacturing a few of our lines there, out of necessity. But we've made a commitment to keep this company in New York. It's the difference between paying ten dollars an hour and two dollars a day." Previously Brown worked for Black & Decker and Johnson & Johnson. "My connection to this company started with my wife," he tells me. "She has hundreds of Madame Alexander dolls."

The Alexander Doll Company makes 400 types of dolls a year and more than 3,000 dolls a day, ranging from classic characters from *The Wizard of Oz* and *Cinderella* to "Coca-Cola" dolls, "Betty Boop" dolls, "Huggums" soft-bodied baby dolls and "Cissy" haute couture dolls with fake fur coats, strapless gowns, velvet skirts and silk underwear. There are all sorts of dolls made here, ranging in price from $25 (for a Huggums) to $400 (for some Cissy dolls) and higher.

"We sell 100 Madame Alexander dolls a week," says Mildred Hicks at FAO Schwarz's flagship store in Manhattan. "People ask if they are made in the United States. They are willing to pay more for the name,

"Runway Review Alex" fashion doll (opposite) started with a sketch and fabric swatch. Madame Alexander poses with dolls in a '20s publicity shot.

PHOTOGRAPHS BY RICHARD WALKER



Doll makers place wigs on "Wendy" figures (above), paint details on the face of a high-end "Cissy" (top, right), and create tiny floral bouquets.

the quality and the tradition." But children aren't the largest market; the most ardent buyers are the adult collectors.

The Madame Alexander Doll Club currently has more than 10,000 members, a Website and annual conventions. "Many adult buyers are doctors, lawyers, professional women," says Lia Sargent, a vintage doll dealer. "They want to have something beautiful and luxurious. Also, it is a shrewd investment." Sargent owns two "Deborah" dolls that sold for $69.95 in 1951 and are each now worth $15,000.

The Alexander Doll Company was founded by Beatrice Alexander Behrman, one of four daughters of Russian Jewish immigrants Maurice and Hannah Alexander. Her father opened the nation's first doll hospital on the Lower East Side in 1895, the year she was born. The family lived above the business, part of a world described as a "ghetto, where people lived on top of one another."

As a child, Beatrice (then known as Bertha) retreated to a small garden, created by her mother, where she read poetry and novels, including Louisa May Alcott's *Little Women*. After graduating from high school in 1912, she married Philip Behrman, and three years later they had a daughter, Mildred. Soon World War I began, and German goods were embargoed, including dolls, the bulk of her father's repair and retail business. At the time, many dolls came from Germany and France and were made with unglazed porcelain heads that broke easily. To help their father, Bertha and her sisters decided to make inexpensive cloth dolls at home. They sold well, and the business survived.

"In those days," Beatrice said in an interview in 1962, "every time a broken-hearted girl came to my father's hospital with a doll that had fallen apart, my childish sympathy and maternal instinct made me resolve that some day I was going to make unbreakable dolls." So in 1923, with that dream and $1,600, Beatrice Alexander Behrman set up a doll-making shop at her kitchen table, a business that would one day make her famous.

Alexander admired the elegant Lenci dolls from Italy, created by Elena Scavini, who called herself Madame Lenci. Following Scavini's lead, she began to sculpt in fabric, molding what she called a "proper face." "I didn't want to make just ordinary dolls with unmeaning, empty smiles on their painted lips and a squeaky way of saying 'mama' after you pinched them," she said. "I wanted to create dolls with souls." Also following Scavini's lead, Beatrice (née

P. 105 MADAME ALEXANDER DOLL COMPANY

In the company's doll hospital, Greta Schrader helps wigmaker Felicia Florentino repair a Madame Alexander doll that had been "loved too much."

Bertha) Alexander Behrman decided to call herself "Madame Alexander."

By the 1930s, her company had expanded into its own storefront and factory. Alexander was selling her dolls to major department stores including FAO Schwarz, Macy's and Marshall Field's. Her first success was an "Alice in Wonderland" doll, then came others inspired by characters in Dickens' novels. When the film version of *Little Women* was released in 1933, her doll series of the March sisters became hugely popular. In 1936, a year after she secured the rights to make dolls of the world-famous Dionne quintuplets, sales were so successful that her company became one of the top three doll manufacturers in the country. In the United States, the doll industry was now a $22 million business with more than 50 competing companies. The same year, *Fortune* wrote that Alexander "is deferred to by all the gallants of the business as the Queen of Dolls."

"She gave American doll making status in the world," said Krystyna Poray Goddu, founding editor of *Dolls* magazine. "For girls in mid-20th-century America, Madame's signature blue box, with a beautiful Alexander doll inside, was one of the most coveted gifts of the day."

In 1951 the New York Fashion Academy awarded Alexander a gold medal, the first of four she would win for clothing design. The Alexander Doll Company now employed hundreds of people in several locations. So in 1953 she consolidated and moved to an old Studebaker factory in Harlem.

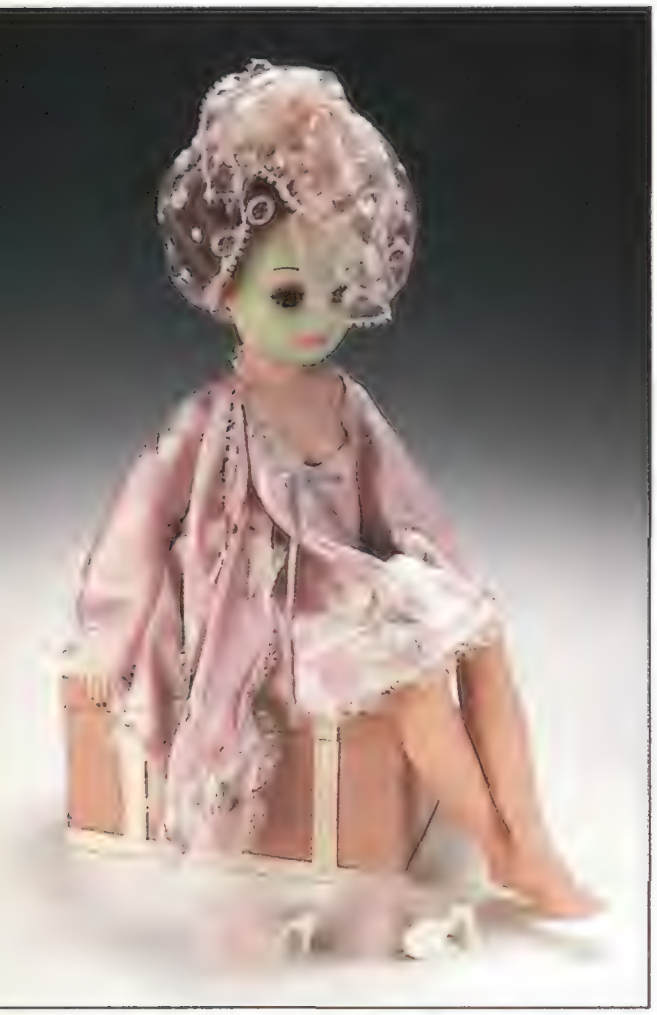
Moving the business filled a need for more space at lower rent, but it also reflected changes in Manhattan's labor force. "In the early days," says Rocco Miranti, manager of Local 223 of the Amalgamated Industrial Toy and Novelty Workers of America, "most toy workers were Italians, Germans and East European Jews." But after World War II, these groups began to move out of factory jobs, and into the suburbs. Blacks and Latinos, meanwhile, were arriving in large numbers from the South and the Caribbean and settling in upper Manhattan. Rather than leave the city, as many doll companies were doing, Alexander moved closer in.

In 1953 Alexander created 36 dolls in honor of the coronation of Queen Elizabeth II. When they went on display at Abraham & Straus, more than 7,000 people went to see them. In 1955 she introduced her first full-figured, high-heeled fashion doll and called her Cissy. In 1968 the Smithsonian Institution added her "Madame" doll and "Scarlett" (O'Hara) doll to its collections at the National Museum of American History.

By the 1960s, Madame Alexander had become an icon. She was received at the White House and traveled across the country to department stores, drawing crowds of people who lined up with their dolls to be autographed. Frances Einhorn, Alexander's personal secretary for 33 years, once recalled a woman weeping and kissing the hem of Madame's dress. "There was a fanaticism, like what you would see with Elvis and the Beatles, among her fans."

"Her dolls were for the blue-haired lady who took her granddaughter in pigtails and a coat to lunch, then showed her a glass case of Madame Alexander dolls in a store and asked her which one she wanted," said Glenn Mandeville, a doll historian and collector. The 1950s were the heyday for Madame Alexander dolls, but eventually "those days were over."

In 1988, at age 93, Alexander sold her company to two businessmen,



The Alexander Doll Company makes beautiful and very collectible dolls, including (from left): "Cissy," wearing a peignoir from the 1997 Secret Lingerie collection; a 21-inch "Black Mourning Scarlett," nominated in 1999 for the Doll of the Year award by *Dolls* magazine; the *Wizard of Oz* collection, with Dorothy donning special ruby-red slippers in honor of the 100th anniversary of the book's publication; a limited edition "Peacock Rose" doll that retailed for $1,000; and an original 14-inch "Margaret Bride" made in the 1950s.

but the company failed, and in 1995 it was purchased in bankruptcy court by a group of investors, led by Kaizen Breakthrough Partnership, an investment firm that hired Herb Brown to run the place. He has introduced modern production methods to help keep costs down, and now "we are on the right track," exclaims Brown.

On a tour of the factory, I walk past a sea of sewing machines and find Greta Schrader sitting at her desk inside the company's doll hospital. Next to her is a bulletin board covered with pictures of little girls with their dolls, and on the wall is a white banner with a yellow cross. "We get over 80 dolls a week," she says. "They've been loved too much. We reroot hair, paint lips, fix clothes, anything we can."

Schrader has been with the company 45 years and is a popular figure at Madame Alexander Doll conventions. She is also a union chairperson. "It is hard to make a doll today that is affordable without compromising quality," she explains. "The stitching is the same; the colors are still there, but the material is not what it once was." She pauses and continues, "It's like beginning again."

In a quiet room away from the factory, Daun Fallon, the senior designer and the person many believe is the guardian of the design traditions, stands over a cluttered drafting table. An old black Singer sewing machine is on a table next to her. "It's over 70 years old. I use it all the time." She picks up a yellowed manila envelope with pencil sketches and blows dust off. Swatches of fabric are stapled to it, and paper patterns are folded inside. "We still design dolls the same way today." As she looks at a new sketch, Fallon explains, "I get my ideas from movies, art exhibits, children's books, cartoons—everywhere. I prefer simpler dolls, and there is also the cost issue to consider. Most of our garments are made here, but some of the fine work is done overseas."

Down the hall, several men stand at large cutting tables using heavy scissors and electric knives to cut silk, lace and fake fur into patterns. A woman wearing jeans then puts the pieces into numbered boxes. "I have to make sure that everything, even the shade of the fabric, is just right," she tells me. Down the next aisle are stacks of boxes filled with feathers, boas, jewelry and appliqués.

Nearby are the sewing cells, seven U-shaped perimeters where women sit at presses and sewing machines, stitching fabric, and adding hats and ribbons, as the garments move from one station to the next. "Each cell works as a team and makes an entire dress or whatever is needed," says Dennis Palmer, director of operations. The processing time to make each doll has been cut in half.

But it is a challenge to speed up production and maintain the quality of the past, considering the way Madame Alexander used to work. "Every day she would walk miles across the factory floor," Frances Einhorn once recalled. "If she saw lace on a hem that

seemed to be frayed or uneven, she would complain and demand that it be fixed immediately. It wasn't nit-picking; she was the quality control for the entire company."

Altagracia Villa, a supervisor from the Dominican Republic, stands by a sewing cell holding a stack of doll clothes and describes the impact of the changes on the employees. "At first the workers complained about the new system, but they feel better now. I hear them talk. The cells are even beginning to compete with each other," she laughs.

Downstairs women work at long tables painting eyes on the dolls, adding earrings or combing hair. One woman attaches pink plastic arms and legs to a torso using surgical string to hold the parts together. At other tables women wrap the finished dolls in pink tissue paper and carefully put them into the signature blue boxes.

Verlease Kearse once sat at a foot press, carefully and quickly wrapping ribbons around inch-high bouquets of plastic flowers. "I did hats, flowers, bridal bouquets and rhinestones," explains Kearse, who moved to New York from South Carolina in the '50s and just retired last August. "I think about Madame all the time. She used to come by and show me how she wanted the work done. She was happy and always gave me a smile. I knew my job and thanked God for it. It helped my husband and me raise our family. I'm a grandmother now," she smiles. "I was there over 40 years."

"We have a contract and we abide by it," explains Miranti. "Our goal is to keep the company in Harlem and have a satisfied shop, and at this point, we're succeeding. The company has recently decided to move their warehouses and shipping center to Kentucky, but I can't imagine them moving the factory." Brown agrees. "We've got a trained workforce here that would be nearly impossible to reproduce. And in New York we're near the center of the fashion industry, which has always been important to this company."

"When I came here I wondered if I could represent this product in the marketplace," says Brown. "I think it's important to believe in what you produce. But I have seen the joy in the eyes of my wife and daughter as they open one of our blue boxes. At the end of the day, we are creating happiness and beauty."

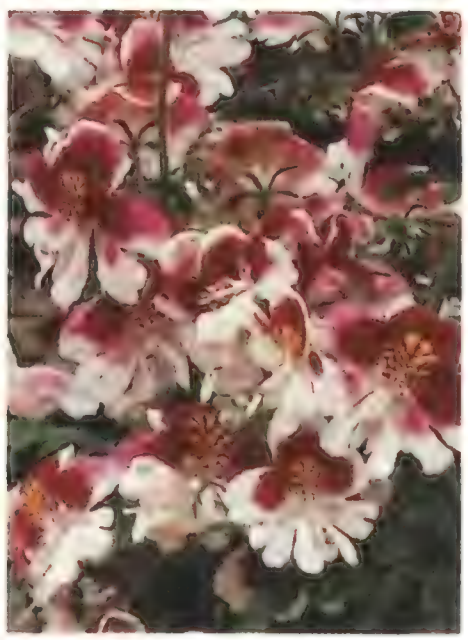
"Many of our workers have children in college," says Dennis Palmer. "In their countries of origin some were schoolteachers and nurses. They have immigrated here, just as my own parents did," just as Beatrice Alexander's parents before them, seeking the American Dream.

Madame Alexander always used to say that the love of a child for a doll has the same depth of love as the love of a mother for her child. She would be happy to know that this child is still thriving in Harlem.

This is Jere Van Dyk's first assignment for SMITHSONIAN. *Richard Walker photographed the November 2000 cover.*

BRUSSELS' PALACE OF

GLASS & GREENERY



KING LEOPOLD II OF BELGIUM WAS DEEMED A MONSTER BY MANY, BUT HE CREATED A REALM OF FLORAL BEAUTY AT HIS ESTATE

Flowering plants (left) fill the royal greenhouses, including (clockwise from top right) rose grape, *Schisanthus zetusus*, hydrangea and cineraria. Towering palms, some of them from Leopold's time, soar inside the glass-and-metal dome (opposite) of architect Alphonse Balat's masterful Winter Garden.

Smithsonian Journeys

BY DALE MACKENZIE BROWN ◆ PHOTOGRAPHS BY SKY BERGMAN

"All that I desire," Leopold said, upon his accession, "is to leave Belgium larger, stronger and more beautiful."

A statue of Diana is framed by walls of geraniums and a cascade of pendant fuchsias in a small gallery off the glassed-in Great Gallery, which connects several of the greenhouses. The six-foot-tall geraniums are trained on wires to achieve a climbing effect. The fuchsias here date back 25 years; the geraniums are 8 years old.

LEOPOLD II, KING OF THE BELGIANS AND ONE OF THE WEALTHIEST AND MOST reviled men of the late 19th century, was showing his young nephew and heir, Prince Albert, around the palace grounds at Laeken on the outskirts of Brussels. Albert, taking note of the grandiose building schemes the bearded older man had undertaken, thought to please him by saying, "Uncle, this is becoming a little Versailles." "*Little*?" huffed the king.

No one can say that Leopold failed to dream and act big. Chief among the Laeken projects was a series of 16 huge, interconnected greenhouses. Built in stages starting in 1874, these structures constitute a palace unto themselves, complete with dining hall, theater and reception areas. And, in an expression of the king's power, they are dominated by an 82-foot-high dome, the Winter Garden, surmounted by a lantern and an immense crown.

In their light and airy construction, made possible by refinements in techniques for mass-producing glass, iron and steel, the greenhouses heralded modern architecture. The credo of the man who designed most of them, Belgian architect Alphonse Balat—"Simplify, simplify again, always simplify"—anticipated Mies van der Rohe's 20th-century dictum, "Less is more."

Inside the greenhouses, "more" reigns. The complex contains one of the largest and finest private botanical collections in the world. Once a year, usually from the last week of April through the first week of May, the king invites the public to come see the greenhouses and the exuberant displays of thousands upon thousands of flowers brought into simultaneous bloom by the dedicated staff of gardeners. But while this event rivals England's Chelsea Flower Show for color and splendor, and even Holland's famed bulb garden, Keukenhof, it is, like the astonishing buildings themselves, little known outside Belgium.

Leopold was a giant of his age, and, as I would discover, his story is inter-

twined with that of his greenhouses. Though he reigned over a country much smaller in area than West Virginia, he labored throughout his 44-year rule to make Belgium a world power and to turn its capital into a city worthy of international acclaim. "All that I desire," he said upon his accession in 1865, "is to leave Belgium larger, stronger and more beautiful." The only way he saw to make this happen was to acquire a colony.

Incredibly, Leopold would do just that, except that the colony, the Congo Free State, which was more than 60 times the size of Belgium, would belong initially not to Belgium but to the king himself—his own private fiefdom. With the millions of francs he received annually from the sale of its abundant natural resources, the architecture-loving king attended to his goal of making Belgium more beautiful. In the process, he changed the face of Brussels. But his primary focus would remain Laeken. Over the four decades of his reign, he lavished his private funds on the estate, doubling its size, adding new roads, rebuilding the royal residence and creating the sprawling greenhouses.

When I first saw the king's palace of glass on a sunny April day, the multi-domed buildings seemed to float above the undulating landscape, their thousands of panes gleaming in the sunshine with the iridescence of soap bubbles. Erected on a slope, the greenhouses are 33 feet higher at their upper end than at their lower, and cover almost four acres. Though a walk through them adds up to half a mile, by starting at the highest point and moving to the lowest, I did not feel the distance, distracted as I was by the bounty of flowers around me. "We give them a dream," says Paul Van Gorp, the aristocratic gentleman in charge of the greenhouses and the palace grounds. And a dream it is.

Leopold, it seems, was less interested in having his collection become a scientific showcase than in ensuring it would charm the senses. Princess Stephanie, the second of his three daughters, had few fond recollections of her stern father, but happily recalled how "tropical and sub-tropical plants . . . rose to form a green dome, their branches rustling down in flowery cascades. . . . Orange-tinted sand covered the paths, which led through this forest of blooms, amid fountains, and mysterious grottoes." Following those paths, said Count Louis de Lichtervelde, the king's earliest biographer, "is like traversing an enchanted country."

Princess Stephanie and Lichtervelde, if they were alive today, might be surprised to see how little the greenhouses have changed. The Azalea House still overflows each spring with billowing mounds of bright blossoms. Just as in Leopold's time, hundreds of geraniums trained on wires to stand more than six feet tall line much of the 656-foot length of the Great Gallery that links several of the greenhouses, while overhead dangle the blooms of 17 different varieties of fuchsias. I quickly fell under the spell of this tunnel of flowers, bedazzled by the color and sweet smell of lilac-tinted heliotrope.

Rarely did a day pass when the king failed to visit this realm of perpetual spring. Glassed-in passageways like the Great Gallery enabled him to stroll

A plainly dressed Leopold sports his signature beard in an undated photograph (top). The king was reputed to be the busiest Belgian and "the keenest financier in Europe." A mosaic (bottom) bearing the double Ls of Leopold's monogram adorns the floor of the Winter Garden.

BETTMAN/CORBIS

A stairway replete with hydrangeas leads to the Palm Tree Pavilion and the private apartment where Leopold spent his last days. The lacy-looking plants in the foreground are a variety of hydrangea that was recently brought to Laeken from France.

from the royal residence and through the collection without ever being exposed to inclement weather. Suffering from a sciatic condition that plagued him from childhood on, he would limp along the paths, followed by his aide-de-camp or secretary taking dictation. I could easily picture him halting from time to time and leaning on his cane to take a closer look at his flowers.

"Flowers," said a contemporary of the king, "are his poetry, and his revenge for the demands made by reality." Leopold did not have a happy life. Born in 1835 and christened Leopold-Louis-Philippe-Marie-Victor, he was a homely, frail baby and was frequently ill. His cold, German-born father began referring to the boy as "the little tyrant" and took note of his slyness, likening him to a fox. At the age of 10, Leopold began arduous military training, and in his 15th year, he lost his mother, a woman of cheerful disposition who had tried to give him love, though her attachment to her two sunnier children, another boy and Charlotte, the future ill-fated empress of Mexico, was inevitably stronger. Without his mother's support, the prince withdrew into himself.

Three years after the queen's death, Leopold's father sought an appropriate bride for the 18-year-old. He selected a Hapsburg princess, descended, like the crown prince, from Empress Maria Theresa. The groom was hardly Prince Charming. One particularly vicious commentator described him as "a stick of asparagus, with a narrow chest and no suspicion of a beard," who "talks a good deal and is not without wit, but he talks like an old man." And then there was his long nose. Baron von Humboldt, the German geographer, joked that it "threw a shadow like the shadow of Mount Athos." "It is such a nose," commented Great Britain's prime minister, Benjamin Disraeli, "as a young prince has in a fairy tale, who has been banned by a malignant fairy."

The bride was only 16. Well educated and already well developed physically, she loved riding and had a raucous laugh. A female member of Vienna society likened the match to a marriage between "a stable boy and a nun, and by nun I mean the Duke of Brabant"—a title conferred on Leopold by his father. A month following their marriage, the bride wrote to a friend, "If God hears my prayers, I shall not go on living much longer—unless everything changes."

When shortly thereafter the bridal couple went to visit Queen Victoria and the prince consort, Albert, the queen reported to her "dearest uncle," Leopold's father, what she had observed of their behavior. Furiously underlining her words, she felt constrained to tell him that she discovered Marie-Henriette, the bride, to be "particulary intelligent & rightminded . . . & full of instruction with a highly cultivated mind. All this gives her a decided superiority over Leo & unfortunately there is no sympathy or tastes or pursuits between them."

"Flowers," said a contemporary of the king, "are his poetry, and his revenge for the demands made by reality."

Out of the union of the mismatched pair eventually came a son, a happy little fellow, fond of riding on his Shetland pony, which he called Kiss-Me-Quick. Leopold loved the boy dearly, but the prince took sick at 9 and died. The king, who did not easily show his emotions, wept uncontrollably in church and had to be supported by his brother as he joined the funeral cortege.

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For most of the year, the Fern Cross Greenhouse is a conservatory. During the spring opening, however, it is transformed into the beguiling scene above. The orange-colored path winds between banks of brilliant primroses, kalanchoë and streptocarpus and terminates in the intimate seating area and backdrop of rose grape at rear. Arching ferns overhead add drama to the setting.

To compensate for this great loss, Leopold threw himself into his work, laboring from dawn well into the night, seven days a week. But however involved he may have been with affairs of state and his quest for a colony, he was never too preoccupied to pay attention to any detail associated with his greenhouses.

Leopold especially loved playing gardener and architect, and the Laeken projects would engage him to the end of his life. He must have driven the taciturn Balat crazy with endless suggestions and changes. The long-suffering architect has been described as "a sphinx with clipped wings." Yet somehow Balat prevailed. His genius at Laeken was to span and capture space in a web of iron and steel so thin as to make the results seem as weightless as a fish skeleton.

Balat's masterpiece is the immense Winter Garden. A traditionalist at heart, he could not see himself building a structure of such size, 187 feet in diameter, using only glass and iron, though the new technology would have made this feasible. His response was to design a circular stone colonnade of 36 Doric columns, on whose entablature would rest most of the weight of the metal framework. Standing beneath the dome and staring up at it, I marveled that it could be so delicate; it is like a giant, inverted, multi-petaled flower.

With the Winter Garden's superstructure in place by 1876 and other buildings nearing completion, it remained to stock the plants. Again Leopold became personally involved, corresponding with botanists, gardeners and suppliers throughout Europe and buying widely. Though the palms came from private Belgian collections, they represented species from all over the world—Madagascar, Tasmania, Tahiti, China, Arabia, Brazil. The Duke of Arenberg offered the king several that had outgrown his conservatory at Enghien, 22 miles from Laeken. But getting them

there posed problems. The trees were 39 to 42 feet tall; one weighed more than 24 tons. Letters suggesting how best to move them flew back and forth. Should they be shipped upright or on their sides? And what effect would the convoy have on traffic? In the end they were tied down in railway wagons and drawn by some 20 sturdy horses traveling at night. Their transport took 16 hours.

With his palace of glass at last ready, the king threw an inaugural party in the Winter Garden on May 20, 1880. There was much to celebrate, including Leopold's 25th year on the throne and the birthday and engagement of 17-year-old Princess Stephanie to Archduke Rudolf, heir to the Austro-Hungarian Empire. The Vienna Men's Choir, famous throughout Europe, journeyed from Austria to perform. The 200 choristers were met at the station in Brussels by a cheering crowd and greeted along the way by throngs lining the streets. Leopold, who had little fondness for music, which he considered "the most costly way of making a din," was on his best behavior and complimented the men on their fine singing. When one of them told Leopold how much more beautiful Brussels had become since his last visit, the king gave a diplomatic response: "My ambition is to make Brussels the most beautiful city in the world . . . after Vienna."

Ever the builder, Leopold was not content to stop with the Winter Garden complex. He was a monarch the world now took note of. Early on, he had arranged for loans and drawn upon his royal allowance and inheritance to set up a crude infrastructure in the Congo, even hiring the African explorer Henry Morton Stanley to set up trading stations. He advanced his interests under the smoke screen of stamping out the slave trade and opening "to civilization the only part of our globe which it has not yet penetrated. . . . " The European powers mis-

Glass and metal harmonize to form the graceful structure of the gallery and entrance gate that link the Mirror Greenhouse and the New Orangery. The pastel hue of the lilacs echoes the opalescent luster of the building, which is off the beaten track at the estate and not accessible to visitors.

took him for a great humanitarian and named him trustee of the territory, which they designated the Congo Free State, "free" because they saw it as being neutral and open to all trade.

Soon afterward, Leopold had Balat draw up plans for a Congo Greenhouse at Laeken. Completed in 1886, it is 98 feet square and topped by an octagonal dome, on the peak of which can still be seen the five-pointed star of the Congo Free State.

Other structures followed—among them the Embarcadère, the junglelike Palm House and the brick Palm Tree Pavilion, with an apartment for Leopold to use as a retreat. The small but elegant Embarcadère serves as a showcase each spring for specimens of *Medinilla magnifica Lindl*, or rose grape, a Philippine species that sports pendulous rose-pink flower clusters.

In 1891, when more of the new buildings were finished, Leopold held a second inaugural celebration. He must have been in an expansive mood. Ignoring the trust placed in him by the European powers, he had gained complete control over the Congo Free State, claiming the right of an author to the "fruit of his labor." In time he would slam the door shut on free trade, effectively reserving the colony's spoils for himself. Luck was with him: thanks to the invention of the pneumatic tire and the automobile, there was a sudden demand for rubber, and the Congo had a seemingly limitless supply.

The inaugural party was for the 600 or so workers who had helped build the new greenhouses—a most unusual gesture for any king to make, much less a monarch as autocratic as Leopold. The men were feted at a table 138 feet long and served ham, cold cuts and slabs of bread, which they washed down with strong Belgian beer. One wag would later comment that by giving the party for the workers, Leopold—despised by the socialists—was responsible for inventing Belgium's first Labor Day. After the meal, the group adjourned to the Winter Garden, there to be entertained by a regimental band. As the highlight of the event, the electric lights recently installed throughout the greenhouses were turned on for the first time, leaving the crowd spellbound.

TODAY MUCH OF THE LABOR OF THE 18 GREENHOUSE GARDENERS AT LAEKEN is directed toward providing—as director Van Gorp says—a dream consonant with Leopold's original vision. Their work begins almost the instant the last of the visitors depart each year (a record 127,000 came in 2000). The geraniums and fuchsias, for instance, are pruned severely, and the shriveled blossoms on the azaleas are removed by hand to encourage good foliage growth and ensure that the bushes will be covered with flowers the next year. The gardeners and technical staff are young and well educated, a new breed. They must be specialists, able to pamper tropical and subtropical plants that evolved in warmer regions. They are masters at creating and maintaining different climates and at meeting the precise nutrient and moisture requirements of individual species.

To care for the plants here is to have a relationship with them. Indeed, Van Gorp regards them almost as children: "We watch them closely. We record everything and learn their idiosyncrasies." Nothing pleases him more than a plant

restored to vigor. "You can see it in the leaves," he says. "Then you know that the roots are healthy too. The leaves and roots are like mirror images of each other."

Getting 5,000 flowering plants to blossom by the April opening struck me as the staff's greatest challenge. New plants are started from seed according to precise timetables. The azaleas, after spending their May-to-September growing season under the open sky, are brought back inside in autumn. But once the flower buds begin swelling, the bushes must be removed to a cool cellar, given relatively little water, and kept under dim light to prevent the incipient flowers from opening prematurely. Hydrangeas normally bloom in mid-summer, but at Laeken, to hasten them along, they are subjected first to a period of cold from October to December, then in mid-January, they are exposed to warm temperatures for two to three weeks, which allows them to set buds that will be open by late April. All this represents only part of the activity that goes on behind the scenes. Skilled workers—part of the staff of 85 responsible for maintaining the palace grounds—are always on hand to make repairs, remove rust, paint the metal, service the 14 oil burners and tend to broken panes.

This year marks the completion of a 28-year-long restoration that called, among other things, for the replacement of all the old glass with panes coated with a thin film of tin oxide. The film lets the sun shine through but prevents the warmth from dissipating as rapidly as would ordinary glass. As an unexpected side benefit, it gives the exterior of the greenhouses their opalescent sheen. More practically, the installation of the new panes has lowered heating costs 25 percent.

A measure of the effectiveness of these combined efforts is the longevity of the plants. I was impressed to learn that many date from Leopold's time, and even earlier. Most of the 40-some orange trees in the Orangery are now 200 to 250 years old. When Van Gorp first examined them a quarter of a century ago, they were in bad shape. But to tamper with them posed risks. Only after ten years of study and experimentation did he begin to replace their heavy, compacted soil, which retained water that was threatening to rot the roots, with a lighter, more friable mix, and start applications of a specially devised fertilizer. The trees soon responded.

Leopold was particularly proud of his 1,000 camellias. The roughly 200 varieties that survive represent the best-preserved collection growing indoors anywhere in the world. They, too, were in a bad way, and they, also, have benefited from Van Gorp's intervention. He had their square tubs lined with Styrofoam, to increase warmth around the roots, and replaced the old soil with composted oak leaves, humus and a little clay.

IT IS IRONIC THAT LEOPOLD'S GREAT MONUMENT SHOULD BE his greenhouses. He may have stamped out the slave trade in Central Africa, but he was responsible for the rise of another form of slavery. His agents forced the Congolese to tap the forest's wild rubber vines, assigning them all-but-impossible quotas and often holding their families hostage until these were met. For the poor souls unable or unwilling to comply, the punishment could be mutilation or death. Overworked, demoralized, starving, ready victims of disease, the Congolese died by the millions. Leopold, who never visited the Congo, must have

Paul Van Gorp, director of the Royal Estate at Laeken, pauses in the Azalea House during the spring opening of the greenhouse complex. Hundreds of azaleas are painstakingly brought into simultaneous bloom each year to create this dramatic display. Van Gorp came to Laeken as an agronomist in 1974 and has been director since 1975.

The Winter Garden, right, and the Congo Greenhouse were designed by Balat. The buildings culminate, respectively, in the two emblems of Leopold II's reign—the crown, atop the Winter Garden, and the five-pointed star, symbol of the Congo Free State. The king had wanted to fill the Congo Greenhouse with tropical plants from his colony, but found that few would survive in an artificial setting. Today it houses Indian rubber plants, palm trees and ferns. The glass that sheathes the greenhouses is coated with a film of tin oxide, which gives the structures their iridescent sheen.

heard of the atrocities being committed there. Though he was called a mass murderer, a greater Caligula and another Nero by the world press, he seemed unperturbed by the outrage his cruel policies elicited in Europe and America.

As might be expected of such a man, Leopold made a poor husband and father. His marriage was to remain as loveless as it had been at the start. Princess Stephanie—whose own unhappy marriage ended with the double suicide of her husband and his mistress—remembered that when the family gathered for meals, "not a kindly word, not a sign of welcome escaped his lips. In silence . . . he seated himself at the table, greeting my mother with . . . a wave of the hand."

The king's daughters fared no better. "His fatherly caresses were rare and brief," wrote Louise, the eldest. "One day at Laeken [he] offered me a gardenia. I was simply stupefied. I was then about thirteen. I hoped for a long time for a repetition of this paternal graciousness, but in vain!" He married off Louise, at 17, to a cousin, the much older Prince Philip of Saxe-Coburg-Gotha. Of her wedding night, she said years later: "I fell from Heaven into a bed of rocks laced with thorns." When the groom left the room, the bride fled to the greenhouses to hide among her father's camellias.

Like his womanizing father, Leopold increasingly sought female companionship in the demimonde. Gossip spread, ignited by rumor; the French press was willing to believe that he was involved with Cléo de Mérode, a pretty Parisian dancer, and soon he was being referred to as "Cléopold." He became a pariah among his fellow sovereigns, with no foreign royal paying a visit to his court during the last 10 to 15 years of his life. "To be a great person," Leopold once said, "is not essentially the same thing as being a good person." Yet he would bemoan being called "a thief and assassin," and when Belgian public opinion turned against him, in part because of his treatment of his family, he characterized himself as king of "a small-minded people." "All that I have done for my country," he stated, "I have done without my country."

The older he got, the more self-involved he became. He grew obsessed with

"To be a great person," Leopold once commented, "is not essentially the same thing as being a good person."

germs, and insisted that he be rubbed with eau de cologne to kill them, that the tablecloths be boiled every day, and that the London *Times* he assiduously read before going to bed be subjected first to the scorching heat of an iron. To ward off colds, the bald king wore a wig on chilly days and, on nonpublic occasions, tucked his square-cut beard into a leather bag to keep it dry.

Yet through it all Leopold never lost his love for his flowers. Such was his devotion that on particularly cold nights he would get out of bed to check on the temperature in the Camellia House. And he never ceased building. He

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On particularly cold nights Leopold would get out of bed to check on the temperature in the Camellia House.

added a greenhouse church in 1895, the Iron Church, as it came to be known (now an indoor swimming pool), and embellished the royal park with two charming follies, a Chinese pavilion and a 131-foot-high Japanese pagoda.

After the queen's death in 1902, the king openly carried on with his latest mistress, Caroline Lacroix, a streetwalker he had met in Paris when she was a teenager and he 65. He bestowed on her the affection he had denied the queen and princesses, and showered her with gifts. On rainy days they would walk "interminably," as she put it, in the greenhouses. Out of their relationship came two sons, whom Leopold in the end legitimized in the eyes of the church, but not in terms of the succession (having failed to obtain Parliament's requisite approval), by marrying their mother.

By then, the king was living in his hideaway in the Palm Tree Pavilion, which he preferred to the palace. Attended by a single valet, he took his meals off a corner of his work table. In 1909 he fell ill. Belly painfully distended, he insisted on working, stretched out on a chaise-longue. When medicine failed to relieve the ailment, the doctor suggested an operation. Minutes before undergoing the knife, the 74-year-old king was still giving dictation. "I am ready," he said, "but on my awakening I want to find myself on this couch, for I have work to finish." He was adamant that a bill before the Senate calling for compulsory military service be brought to him for signature. "I want to live long enough to sign it," he announced. The approved bill arrived as he was coming out of the anesthetic; he appended his name in a faltering hand, thus fulfilling the last of the three goals he had set for himself upon becoming king: to leave Belgium not only larger and more beautiful, but stronger.

Leopold lived two days more, with Caroline at his bedside, dying suddenly on the 44th anniversary of his reign, sealed off from his subjects and the rest of the world in his palace of glass.

Dale Mackenzie Brown is a former editor of Time-Life Books. Freelance photographer Sky Bergman is a professor at California Poly-Technical State University.

THIS JOURNEY BEGINS

In the mood to celebrate spring in a truly colorful and spectacular manner?

SHORT OF FALLING in love, few things beat a visit to Brussels in spring. For a fortnight, the glass doors of the Royal Greenhouses at Laeken are opened to the public in a century-old tradition. It's a blooming extravaganza.

FOR THE OTHER 50 weeks of the year, the royal gardeners (there are 18) coax, tease, cajole and pamper some 5,000 plants behind the scenes as though they were divas ready to stride on stage. As a result, the primroses, azaleas, hydrangeas and dozens of other plants bloom in concert, the floral muscle power of an entire spring and summer pressed gloriously into 15 days.

THIS YEAR LAEKEN is open daily, except Mondays, from April 20 to May 6, 9:30 A.M. to 4:00 P.M.; admission is 50 francs, about $1.15. On weekend nights, the greenhouses reopen from 8 P.M. to 11 P.M., enabling visitors to experience the magic of the lighted gardens at night, serenaded by classical music. Admission is 100 francs, about $2.30. For more information, call 011-32-2-551-2020 or click on www.visitbelgium.com.

Lines for the greenhouses can be quite long, so be prepared to wait. And don't arrive hungry: there are no snackbars. Also, keep your eyes peeled for Belgium's crown prince, Philippe, and his beautiful new wife, Mathilde, who moved into the palace adjacent to the greenhouses last December.

THE TRAIL THROUGH the "city of glass" stretches for more than a half mile, passes through a long string of ten greenhouses and takes anywhere from one to two hours, depending on how often you stop to smell the flowers. The greenhouses are a monument to the ego of King Leopold II, who, as author Dale Mackenzie Brown points out, was one of the most wealthy and reviled figures in history. (For a gripping tale of the monarch's terrible colonial misadventures in the Congo, check out Adam Hochschild's book *King Leopold's Ghost*.)

WANDERING THESE breathtaking glass halls, the air scented sweetly with heliotrope, the irony becomes poignant: How could a man who caused so much suffering also be responsible for so much beauty?

FOR TRAVEL TIPS, stories and more on the Royal Greenhouses at Laeken, click on **smithsonianmag.com/journeys**.
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His Heart Was in the Highlands

Robert Burns' fierce pride, penetrating wit and perfect ear for language gave Scotland—and the world—an imperishable legacy of poetry and song

TWO SUMMERS AGO, QUEEN ELIZABETH CAME TO EDINburgh to reopen the Scottish Parliament after 300 years of enforced silence through two rebellions and imposed union with England. A dour fate, but the Scots are never that enduringly dour, and emotions were eagerly astir over this devolution of power, brokered by Prime Minister Tony Blair.

POEMS,
CHIEFLY IN THE
SCOTTISH DIALECT,
BY
ROBERT BURNS.
KILMARNOCK:
PRINTED BY JOHN WILSON.

Her Majesty appeared as Queen of Scots, but walking behind the Scottish crown, not wearing it. Instead, she wore a jauntily canted purple hat and a stunning purple coat, with a plaid Skye Isle tartan scarf. When she stood to declare her own love for Scotland, she looked, for all the world, like a Highland thistle.

Then there rose up from the gallery another woman in a saltire blue suit. That vivid blue behind the saltire cross on the ancient Scottish flag that also crisscrosses the Union Jack. She raised a fiery song by Robert Burns that every Scot knows by heart:

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Lindal CEDAR HOMES

With hand on the earthly plow, Robert Burns gazes up at his beloved muse. The statue adorns the mausoleum of his burial place, St. Michael's Church, Dumfries, Scotland.

The coward-slave, we pass him by,
We dare be poor, for a' [all] that!

She was Sheena Wellington, a folk-singer and Scottish firebrand from the county of Fife.

The rank is but the guinea's stamp,
The Man's the gowd [gold] for a' that.

Her Majesty, whose likeness is stamped on every guinea—and every stamp, for that matter—looked down at her shoes.

A Man's a Man for a' that,
For a' that, and a' that, . . .
The honest man, tho' e'er sae poor,
Is king o' men for a' that.

Then the singer turned toward the other royals.

Ye see yon birkie [fellow] ca' d [called] a lord,
Wha [who] struts, and stares, an' a' that.

The Duke of Edinburgh stared at his program, while Prince Charles rubbed his nose as her voice trilled throughout the hall.

SCOTTISH MEDIA NEWSPAPERS/SCRAN; P. 124 DUMFRIES MUSEUM, SCOTLAND; P. 125 SCOTTISH NATIONAL PORTRAIT GALLERY, EDINBURGH

A prince can mak a belted knight,
A marquis, duke, and a' that!;
But an honest man's aboon [above] his might,

And on the last verse, all 129 newly seated members of the Scottish Parliament joined her in roaring out the final lines.

It's comin yet for a' that,
That Man to Man the world o'er
Shall brothers be for a' that.

From the Scottish Nationalists, demanding independence, to the so-called Tartan Tories, who hoped they would never see this day—a' would brothers be. By the end of that parliamentary day, a Glasgow member proposed "A Man's a Man for a' That" be made Scotland's national anthem.

Burns wrote this song in 1795. Sending it along to his editor, he admitted songwriters should usually stick to "love and wine." But these were "two or three pretty good prose thoughts, inverted into rhyme," out of Thomas Paine's *Rights of Man*. They have since rung round the world, in every tongue—"the chosen hymn of all high-minded dreamers of a better day."

Through such ringing songs, Robert Burns has made acquaintance irresistibly with much of humankind. Most famously, with his "Auld Lang Syne" that sings in every New Year but also with his moving lines about our everyday fate, out of the most common instances. Once, overturning a mouse's nest in a field, he saw "The best-laid schemes o' mice an' men" oft go awry. Or again, spotting a louse on a lady's bonnet in church, he asked, "O wad [would] some Pow'r the giftie gie us / To see oursels as others see us!" An earthbound genius, Burns only lived to age 37, worn out by his harsh labors in the southwest of Scotland. But by then he was being read everywhere, especially in the United States.

Such auld acquaintance has never faltered, only grows more fond. Early on, Scotsmen began honoring their Ploughman Poet at Burns Suppers, on or about his birthday, January 25. Soon enough, these Scottish rites were being celebrated around the globe. Always with cock-a-leekie soup, drams of whiskey and a haggis, a meat dish that is cooked inside a sheep's stomach. From Rangoon to Qatar, New Zealand to Nova Scotia, Vancouver Bay to Martha's Vineyard, the haggis is piped in,

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[1] Peschel RE, Chen Z, Roberts K, Nath R. Long-term complications with Prostate Implants: Iodine 125 vs. Palladium-103. *Radiat Oncol Invest* 1999; 7:209-266.

[2] Blasko JC, Grimm PD, Sylvester JE, et al. Palladium-103 brachytherapy for prostate cancer carcinoma. *Int J Radiat Oncol Biol Phys* 2000; 46:839-850.

*Cure defined as biochemical relapse-free survival at nine years.

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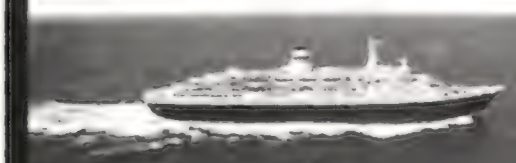

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someone recites Burns' "Ode tae [to] a Haggis," then the first cut is made with the *sgian dhu* dagger. Finally, glasses are raised to the Immortal Memory.

Toastmasters have vied for two centuries to salute what remains immortal in this all too mortal man. Whatever his flaws, says Ian McIntyre in his *Dirt & Deity: A Life of Robert Burns*, he could always "feel what was right." He could feel it in his gut, reacting with such passionate conviction that his character emerges from his verse as the boon companion we all seek. Lord Byron saw best the human paradox within the poet. "What an antithetical mind!—tenderness, roughness—delicacy, coarseness—sentiment, sensuality—soaring and groveling, dirt and deity—all mixed up in that one compound of inspired clay!"

Several days after Robert Burns, so compounded, was born—in the year 1759, in the cottage his father had also built of clay—the gable end blew off. Mother and firstborn went off to neighbors. The lime-washed dwelling still stands in Alloway, scene of the rural family life Burns limned in "The Cotter's Saturday Night." The poem is dead accurate, down to his father's Bible readings, but written in mannered English. Only in Scots did Burns probe the bald truth.

His father gave Burns what small education he could afford or spare from his labor in the fields. Not satisfied with the local school, he joined with his neighbors to hire a young schoolmaster, John Murdoch. A bit of a pedant, Murdoch lodged for a time in Burnes' "tabernacle of clay" (his father spelled the name with an e) and did manage to teach Robert history, the classics, some poetry, even a smattering of French.

William Burnes never succeeded as a farmer—nor did any Burns, ever—and came close to being foreclosed on his deathbed. On the day he died, he gave in to forebodings about one of his family. "Oh, father, is it me you mean?" Robert asked,

Burns moved into this modest house in Dumfries in 1793 and lived here until his death in 1796. On a quiet street, the house is today a museum to the poet.

DUMFRIES MUSEUM (2)

and though 23, turned away in tears.

But the father was prescient, at least by the lights of the Calvinism that Burns came mercilessly to satirize. Very early, "a bonie, sweet, sonsie lass" had initiated him "in 'a certain delicious Passion, . . . I hold to be the first of human joys." Robert struck a lifelong alliance between "Love and Poesy" and "committed the sin of RHYME." Though then his only sin—five stilted verses to Nelly—henceforth, he says, "My heart was compleatly tinder, and eternally lighted up by some Goddess or other."

His scribbling made him the amorous intriguer for less articulate bloods who were also his drinking companions. In 1780 he organized a debating society, the Tarbolton Bachelors' Club, to gain himself an audience as a Scots radical. Even in

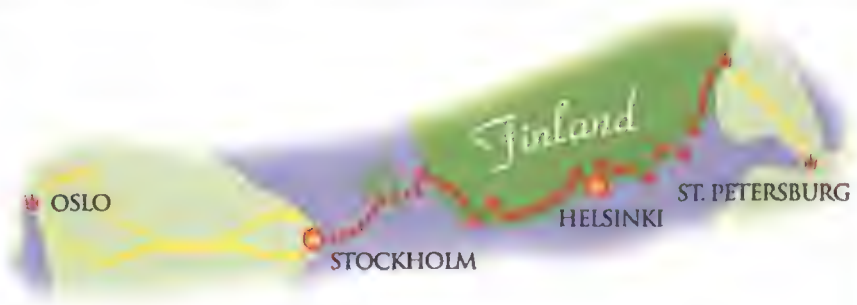
The love of Burns' life, Jean Armour (1765-1834), bore him nine children.

his far corner of Ayshire, trapped into marginal farming with his brother Gilbert, he followed the complicated British politics behind the American Revolution.

But he was already suffering cardiac trouble and bouts of depression from overwork. He felt "some stirrings of Ambition," scratching out catchy, quibbling jingles, but feared his father's poverty had "entailed on me perpetual labor."

A seafaring friend, Richard Brown, sparked his first hopes as a poet. He long remembered, "You wondered I could resist the temptation of sending verses of such merit to a magazine." But Brown also started him coursing after the lassies. He began visiting Poosie Nansie's Inn, in nearby Mauchline, a den of iniquity that he describes in a rollicking ballad, "The Jolly Beggars." And in 1784 he got a servant girl, Elizabeth Paton, in his mother's home with child.

With both chagrin and joy, he greeted the birth in a warmhearted poem, "Welcome to a Bastart Wean." He wishes his daughter



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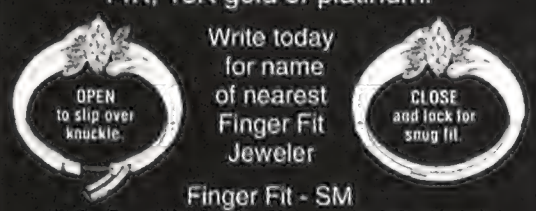

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"Thy mother's looks an' gracefu' merit / An' thy poor, worthless daddie's spirit / Without his failins!" But he must also stand up in the parish church to be branded a fornicator, and in defiant answer, he blasts the preachers with his bawdy wit in "Holy Willie's Prayer"—a comic portrait of an ecclesiastical hypocrite—and "The Holy Fair," a revival meeting where, by Sunday dusk, " . . . love divine [and] brandy; / May end in houghmagandie [fornication]. . . . "

Such verses were soon being recited and handed round in manuscript, like samizdat, the underground newspapers of the Soviet Union. But while professing love and poesy, he was fast sinking into a fateful spiral of near debauch and disgrace.

In Mauchline he meets Jean Armour, daughter of a prosperous mason, and she is very soon heavy with twins. Burns tries honorably, if hastily, to wed her. There is even a signed certificate of marriage between them. But her father cuts out their very names from the offending paper and forces Jean to abandon Burns. "May Almighty God forgive her ingratitude and perjury to me," he writes, full of hurt, "as I from my very soul forgive her!" But they must stand up three times in church to be chastised. The Armours would rather see their daughter publicly shamed than married to the ne'er-do-well poet. Burns is once more a free, if "compleatly miserable," man.

On April 15, 1786, in the midst of these calamities, Burns signed a contract for a book of poetry with John Wilson, a printer in nearby Kilmarnock. Subscription bills went out for an octavo volume, and his brother and many friends signed up for several hundred copies. Now came the question of which poems to choose—really which to suppress. Burns, notes McIntyre, left out "Bastart Wean" and "Holy Willie's

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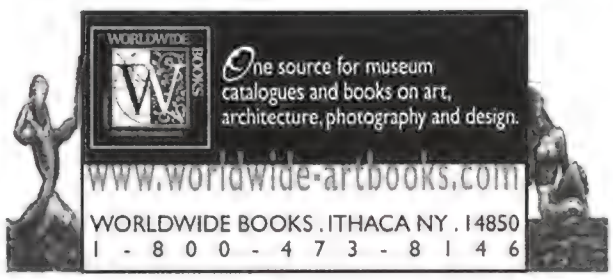

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Gentlemen gather for the annual Burns Club dinner in Newton Stewart, Scotland, in 1904. Such fetes have long saluted the Immortal Memory wherever they have been held.

Prayer," his political thrusts, and any mention of his "Highland Lassie O."

This was the famous Highland Mary, yet another young lady with whom Burns had sought immediate (if not simultaneous) consolation when Jean was forced to leave him. "My Highland lassie was a warm-hearted, charming young creature as ever blessed a man with generous love," he later wrote. She died tragically when a sudden fever "hurried my dear girl to the grave" but a few days after she disembarked at Greenock, returning from the Highlands, he implies, to marry him.

But other than his own post-heartsick words, and some vapid verse in English, little exists to substantiate this tale. Stubborn believers in Highland Mary have preserved the Bible of a Mary (Margaret, in some records) Campbell, from Dunoon, a saucy wench working as a nursemaid. Burns remembered her "by the Banks of Ayr" where they spoke their fond farewells, though nobody since has been able to prove any real tie between them.

Meanwhile, his entanglement with Jean Armour continued. "Would you believe it?" he cried out. "[James] Armour has got a warrant to throw me in jail till I find security for an enormous sum. . . . I know you will pour an execration on her head, but spare the poor, ill-advised Girl for my sake: tho', may all the Furies that rend the injured, enraged Lover's bosom, wait [fall upon] the old Harridan, her Mother, until her latest hour."

What saved him was his *Poems, Chiefly in the Scottish Dialect*, published in Kilmarnock the last day in July 1786. He was 27, scuttling out from under local infamy like one of his own wee, panicked creatures in an o'erturned world, into a lasting fame that is yet rising.

Of the so-called Kilmarnock edition of the *Poems*, Wilson printed 612 copies. More than half went to the subscribers for further distribution and sale. But soon only 13 were left. Robert Heron, who would write the first Burns biography, was a child in neighboring Galloway then, and remembered how "even ploughboys and maid-servants would have gladly bestowed the wages which they earned most hardly, if they might but procure the works of Burns."

His earliest review was an unsigned rave in the *Edinburgh Magazine* that saw "native genius bursting through the obscurity of poverty. . . . An ounce of mother wit, you know, is worth a pound of clergy," the reviewer gibed, though

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Burns "often startles us with a dash of libertinism, which will keep some readers at a distance. . . ."

Hardly. Soon enough, through a social chain-reaction among all classes of readers, he was being introduced to the gentry. Mrs. Frances Dunlop, a widow, was given the *Poems*, and "The Cotter's Saturday Night" worked on her mind "like a charm of a powerful exorcist." She sent for half a dozen copies, asking Burns to call upon her at Dunlop House. Then the Mauchline doctor who had attended his father's deathbed introduced Burns to Dugald Stewart, an Edinburgh professor. Stewart had him to dine with Lord Daer, a youth full of liberal ideas. Burns was bowled over, but held his own. "Nothing, perhaps, was more remarkable than the fluency and precision, and originality of his language," reported Stewart, particularly since Burns "avoided more successfully than most Scotchmen, the peculiarities of Scottish phraseology."

This was the voice of the Scottish Enlightenment, that efflorescence of philosophical thought that burst forth from Scotland in the late 18th century. Those at its seat, the elite at the University of Edinburgh, spoke only the best English. They were prepared to take Burns up, and, of course, improve him, failing to reckon with the force of his Scots verse.

It is a wonder today to leaf through a rare Kilmarnock edition, still to be found, much treasured, in Scottish town libraries. "Unacquainted with the necessary requisites for commencing Poet by rule," he writes, he must sing "the sentiments and manners" he felt and saw in himself and his rustic fellows in his and their native tongue—by rhyming in his own feisty, burred tongue. He made to "Learning no pretence, / Yet, what the matter? / Whene 'er my Muse does on me glance / I jingle at her."

His Edinburgh acquaintances urged him to aspire higher. They

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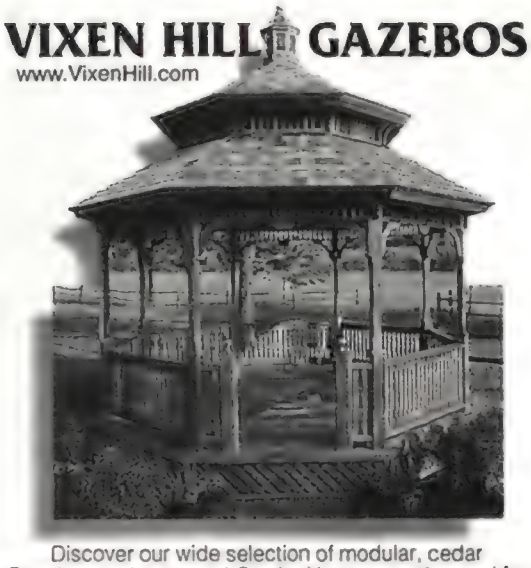

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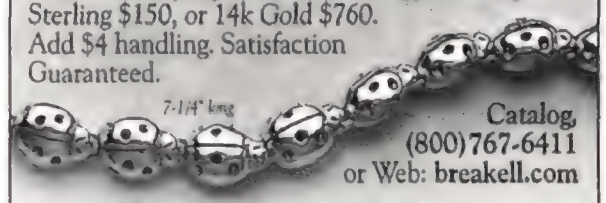

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favored his Anglo-genteel efforts, and he took pains to acquit himself well in English. But Burns mocked the nobs and literati for their snobbery. "Your Critic-folk may cock their nose,"

[But] tho' I drudge thro' dub [puddle] an' mire
At pleugh [plow] and cart,
My Muse, tho' hamely [homely] in attire,
May touch the heart.

And Burns did touch many a heart across the seas, among the growing population of America. His *Poems, Chiefly in the Scottish Dialect* was pirated by a Philadelphia printer. They made "an immediate and lasting impression," writes Andrew Hook of Glasgow University, from the very year of 1789 that George Washington was elected President. Burns even wrote an "Ode For General Washington's Birthday" in his best English, but many Americans could already recite his Scots rhymes by heart.

One reason was demographics: by the Revolution, fully one-seventh of the American population were Scots. Their influence looms even larger through the Scottish intellectuals who had emigrated, such as John Witherspoon, who had taught James Madison. Scotsmen and their descendants make up almost half the signers of the Declaration of Independence, including Witherspoon himself, and three-quarters of American Presidents. (Abraham Lincoln recited Burns' poems while courting Mary Todd, who also knew Burns by heart.)

Through the years, these imported Scots influences have spread like thistles and grown into enduring traditions with a year-round calendar. Following wintertime Burns Suppers come summer festivals of Scottish games and hornpipes, strathspeys and reels. In New Hampshire, every September, the clans gather from all

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over North America and bagpipe down Loon Mountain like a horde led by Braveheart Mel Gibson. But there are more durable memorials to Burns' spirit, which so moved the Yankee heart.

In Barre, Vermont, stands a fine, tall statue of the poet. "Erected By Admirers Of Burns" in 1899, it was rededicated two years ago on its centennial. Burns cuts his most famous rural figure, however, in his memorial at St. Michael's Church in Dumfries, Scotland, where he leans back, hand on a plow, staring up at his muse in a lapis blue sky. But the Vermonters put Burns into his Sunday best, cloak over arm, manuscript in hand.

Just so attired did Burns plunge into the social whirl in Edinburgh, when in 1787 he was taken up for a season by the city's elite. As Dugald Stewart observed: "He retained the simplicity of manners and appearance which had struck me so forcibly when I first saw him in the country." He also found another printer, William Creech, and ready patronage for an expanded Edinburgh edition of his *Poems*.

The second edition brought him far wider fame, but little income and no place. Creech owed him £100 the rest of his life, and after all their coddling, the Edinburgh elite now had no time for a cotter's son. He was last year's literary lion, and saw that "I must return to my rustic station, and in my wonted way, woo my rustic Muse at the Ploughtail."

His only offer for a place was from a landholding patron—a tenancy on one of three farms in Dumfriesshire—take his pick. He decided on Ellisland, with the least arable land, but high on the banks of the Nith River. "Mr. Burns," the factor said, "you have made a poet's, not a farmer's choice."

Indeed he had, and stuck by it. Here he wrote "Tam O'Shanter," his comic masterpiece on Tam's drunk-

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Green grow the rashes O;

He's just—nae better than he should be.

In durance vile here must I wake and weep,

Flow gently, sweet Afton, among thy green braes,

Let them cant about decorum
Who have characters to lose.

Man's inhumanity to man
Makes countless thousands mourn!

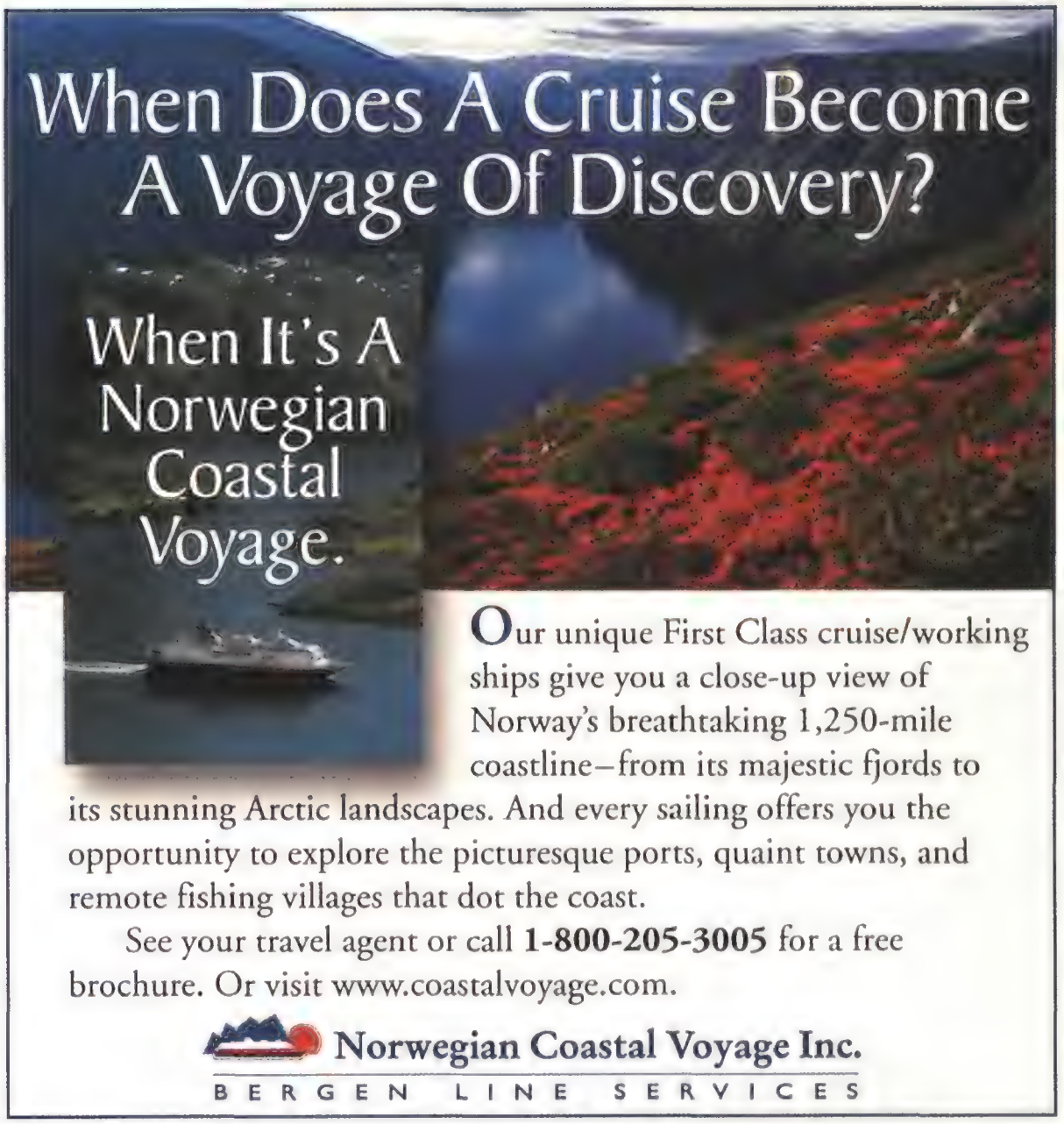
O, my Luve's like a red red rose

Now's the day, and now's the hour;

O wad some Pow'r the giftie gie us
To see oursels as others see us!

The best-laid schemes o' mice an' men
Gang aft a-gley.

For further information about "Auld Lang Syne" and the full translated lyrics, visit www.smithsonianmag.si.edu.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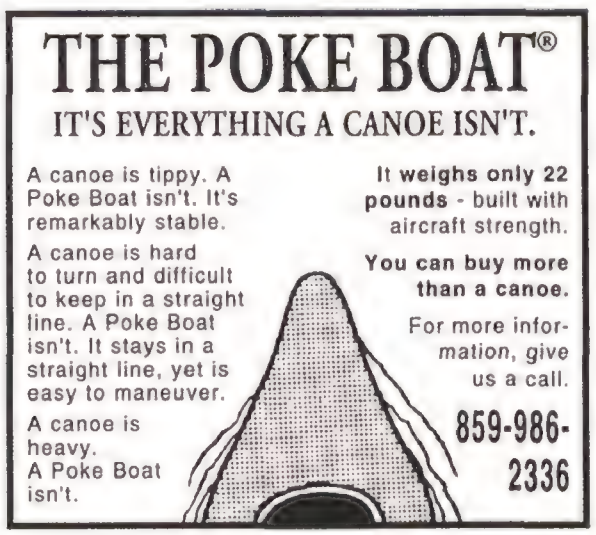
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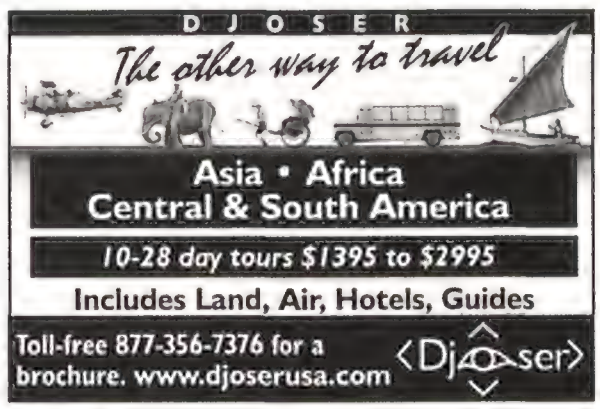

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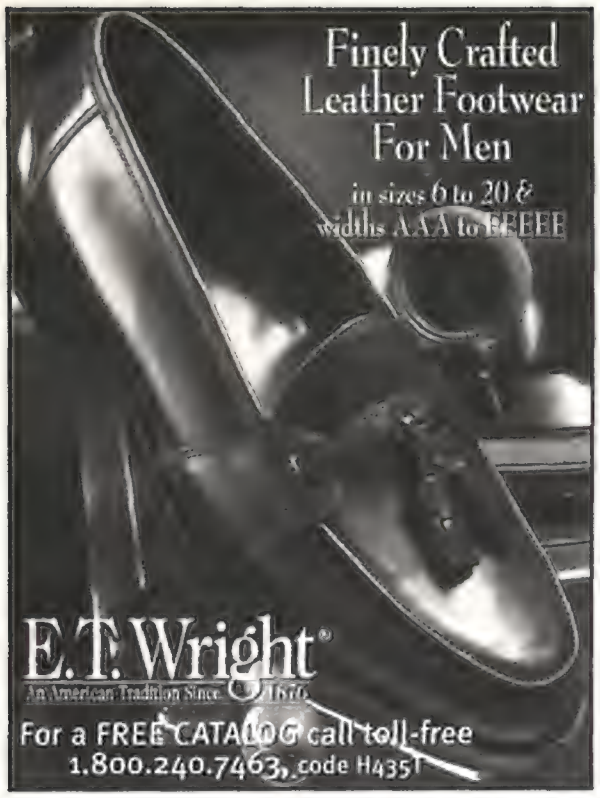
en escape from the witches' coven in the Alloway Church.

Here, too, he at last brought Jean Armour as his wife. She had been brought to bed again by Burns, once more with twins, and her enraged father had shut his door to her. Sadly, the two girls were born dead, but the marriage was finally recognized by the clergy. Gentlefolk like Mrs. Dunlop were aggrieved, but Burns did not care about "polite tattle, modish manners, and fashionable dress." "I have got the handsomest figure, the sweetest temper, the soundest constitution, and the kindest heart in the country."

Behind the plow again, he also pursued the seemingly unlikely prospect of becoming an exciseman—a kind of tax assessor. When the post came through, his friends blanched. He told them "five and thirty pounds a year" was not bad for a poor poet, kicked down from his "little eminence," but knew he had stained his laurels by taking the position. He turned Ellisland into a dairy farm, leaving the cheese-making to Jean. But serving as "a poor, damn'd, rascally Gager," taking measure of small beer, wore him down. So, too, did the long miles of his circuit, riding out in stormy weather. And what had become of his rustic muse, who once followed him everywhere afield?

She had grown shy of him, so he turned to his great love of song. At many a stop at an inn, and on his Highland journeys, he had long been gathering Scottish airs. He always had a stray moment to jot down a few recollected phrases, "which I have pickt up, mostly from the singing of country lasses." Burns collected and restored—often setting new words to old tunes—hundreds of songs for six volumes of the *Scots Musical Museum*. And he was tidy about his attributions, signing *R* or *B* if he did the words over himself, *Z* if he only tinkered with an old text.



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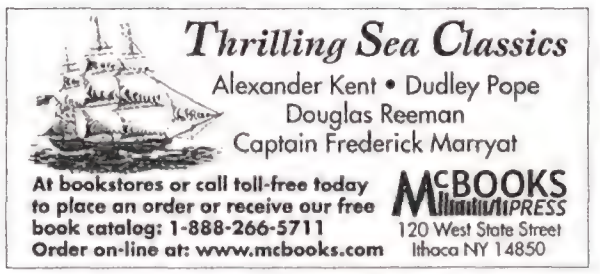
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So tidy that he hardly gave himself credit. Consider "Auld Lang Syne," which originally asked: "Should auld acquantance be forgot, / Tho' they return with scars?" Burns tinkered with the song, "which has often thrilled thro' my soul," until he sent off five verses in 1788 to Mrs. Dunlop, with this chorus:

Should auld acquaintance be forgot,
And never thought upon?
Let's hae a waught [drink] o' Malaga,
For auld lang syne.

Five years later, he finally sent his music publisher the song we have today. A miraculous rewrite. He turned "thought upon" into the near-rhyming "And never brought to mind," then threw out all that Malaga for the welcoming "We'll take a cup o' kindness yet / For auld lang syne" [the Old Long Ago]. Since he "took it down from an old man's singing," he gave himself a *Z* for his "corrections and additions" that created the greatest nostalgia heartthrob in any tongue.

On the other hand, he turned the original of "John Anderson my jo, John," a lusty complaint by a young wife about her old husband's impotence, into a song of heartfelt devotion at life's end. He signed this song with a *B*.

"My Heart's in the Highlands" and some of the finest love songs in any language came to him while searching for "the Poetic sentiment, correspondent to my idea of the musical expression."

Yet he never earned a penny by his songs. All the more reason to cling to his small government post. As his rheumatic heart began to fail him, he was promoted to a less arduous walking commission in the Dumfries Port Division. He moved into town in 1791, settling into an elbow-chair that is still snugged into a corner of the Globe Inn.

"There's an Ayr-Dumfries thing

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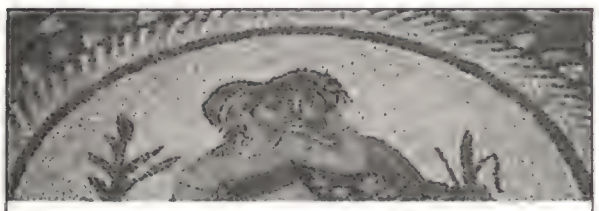

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about Burns," says the Scots poet William Neill today. "If you're born in Ayr, you say Ayrshire gave Burns birth and Dumfries kilt him. If you're born in Dumfries, you say Ayr drove him oot and Dumfries gave him a livin."

Either way, the French Revolution now roiled the political flames, and Burns was flying close to them. His sympathies got him into trouble at the new Dumfries theater when the leading lady declaimed lines Burns had written on a vague feminism, ending with this incendiary salute: "*Ah, ça ira!* [Oh, so will it be!] THE MAJESTY OF WOMAN!!!"

For once it wasn't his treatment of women that brought church and king down on Burns. It was his smattering of French. "*Ah, ça ira!*" was the refrain to the Revolution's bloody anthem, "Ça Ira," sung by the mob as they dragged *les aristocrat' a la lanterne* to be hanged. To save himself, he had to grovel. "I am a Placeman, you know," he confessed to Mrs. Dunlop, referring to his post as exciseman, "a Humble one, but still so much so as to gag me from joining in the cry." To his distant superior, Graham of Fintry, he wrote that he held to "Reform Principles," but "revered" George III. Early in 1793 he was given to understand from on high that he was off a very nasty hook.

Within a month England was at war with France. Burns boomed out patriotic ballads, calling up past Scots heroes to lead the march against the French that had so suddenly become the enemy. "Scots, wha hae wi' Wallace bled" was his challenge to "La Marseillaise." He also helped organize the Royal Dumfries Volunteers, chorusing trueborn loyalty but shrewdly using his last line to give a wee democratic twist to the Lion's tail.

Who will not sing, GOD SAVE THE KING,
Shall hang as high's the steeple;

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But while we sing, GOD SAVE THE KING,
We'll ne'er forget THE PEOPLE!

And he still rose to those last stirring stanzas, declaring "A Man's a Man for a' that." Like an early epitaph. By July, he had gone to the Brow Well at the Solway, to dunk down into its dark, cold waters, desperate for a cure. But as William Neill writes, "the smirr [misty rain] o Solway stoundit [ached] in his banes," and Burns died within a few days.

He left great sorrow, but a blithe, larking spirit. What to make of so brief a travail, hedged round by poverty, illness, misfortune and his own foibles, that yet elevates Rab the Rhymer to so lively a place in the world's sympathies?

Despite all, he inveighed against tyrannies and sang of hearts under love's thrall. "He loved to argue, to tease and banter," observes Alan Marchbank of the National Library of Scotland, "and he loved a good punch line." He asked no quarter when he first turned poet, refusing to doff his cap to his subscribers "with the venal soul of a servile Author, looking for a continuation of those favors," and he kept that pledge in immortal words, if not every deed, to his last poetic breath.

The man of independent mind,
He looks and laughs at a' that.

Four days after his death, the Royal Dumfries Volunteers buried their bardy in his uniform, still unpaid for. His brother Gilbert attended the funeral, but not his young widow, Jean. She was once more abed, in the throes of delivering another son, James Maxwell Burns, their ninth child.

Novelist Brock Brower has written on the literary struggles of Robert Burns, Walt Whitman and other poets.

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The Hungry Years: A Narrative History of the Great Depression in America

T. H. Watkins

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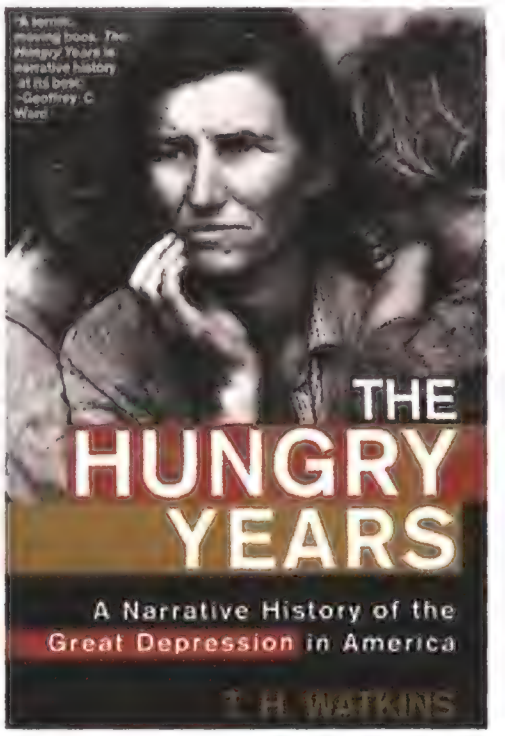
ONE OF THE BEST VIGNETTES IN *THE HUNGRY YEARS*, T. H. Watkins' fine narrative history of the Great Depression, is his account of a forced auction of the stock and equipment owned by a widow whose Nebraska farm went belly-up in 1932, because she couldn't pay the $442 she owed on her mortgage. Twenty-five hundred farmers, many as worn-down and desperately poor as she was, showed up for the auction, and a delegation offered the receiver $100 to settle her debt. The receiver refused, offering to postpone the sale instead, but the farmers insisted that they go ahead. Bidding ensued on her ten cows, 24 pigs and six horses, then her plow, hay binder and corn planter. At the end, the farmers who bought the stock and equipment returned them to the woman and handed the total proceeds of $101.02 to the receiver, strongly urging him to accept it as payment in full on the mortgage, which he wisely did.

The story illustrates one of the more cheering themes of Watkins' ambitious, panoramic tale: the phenomenon of people, suffering the most severe economic hardship, uniting and rallying to help each other, even if only temporarily. A historian, and Watkins was a good one (he died of cancer last year), has to look hard to find a feel-good story amid the anguish and contention of 1930s America.

Watkins' goal is to "pay tribute to those who lived through those times by offering a portrait of the era as rich and full as I can make it." Though he dutifully chronicles the great lurches and heaves that make up the big picture of the Depression and the New Deal—the grim statistics, President Franklin Delano Roosevelt's feverish "Hundred Days," the programs that worked and those that didn't, the emergence of Big Labor, the final guttering out of the New Deal flame—he returns repeatedly to the land and the people. Watkins was an environmental writer for most of his impressive career, and his strength was always his humanity, his sensitivity to the human dilemmas buried within economic and ecological questions. He does the same thing here, moving seamlessly from trends and movements, programs and policies to the individuals who had to live with them.



Watkins' goal is to offer a "portrait of the era as rich and full as I can make it."

The "Bonus Army" march of 1932 was one of the first major eruptions of protest during these years. World War I veterans had been promised a bonus in a 1924 law but told that they would not get it until 1945. When hard times hit and legislators pressed for immediate payment, President Herbert Hoover and a Congressional majority wouldn't go along. A peaceful army of 20,000 veterans, some with their families, set up camp in Washington. Watkins poignantly describes what happened immediately after the Senate voted against them: "'Comrades,' [their leader] shouted to the men, 'We have just sustained a temporary setback. . . . Let us show them that we can take it on the chin. Let us show them that we are patriotic Americans. I call on you to sing *America*.' Slowly, the men complied, and after the last ragged note was lost in the summer night, a few of them booed the name of Hoover, then all drifted back to their encampments."

Watkins' writing gifts are on display throughout this carefully researched book. He seems incapable of writing a bad sentence. In a particularly evocative chapter about the Dust Bowl in the West and Midwest that followed several years of drought, he describes the travail of trying to get through a simple meal: "Everything that could be baked, was baked. . . . Pan-fried meat was cooked on as high a heat as possible, so the air rising above it would lift the dust away. Everything was eaten the instant it left the stove in the few precious moments before grime covered it. Even so, dust was ingested like a condiment with every meal." The only exceptions to the literary grace that pervades this book are occasioned by the sporadic need to cite statistics and to list the onslaught of bureaucratic imperatives.

Watkins also takes the opportunity to rescue some notably quirky 1930s celebrities from obscurity. Hugh Johnson, for example, the ex-general who headed the National Recovery Administration (NRA), was a man with sufficient hubris to

declare that "it is no easy thing to reorient the universe." Arthur Morgan, the first chairman of the Tennessee Valley Authority, was another prize, described by Watkins as "certifiably racist, nakedly elitist, hypersensitive, paranoid and utterly without humor." One of Morgan's associates said he could easily picture him "burning perfectly innocent people at the stake and feeling that he was doing a great thing." John L. Lewis, the founder of the Congress of Industrial Organizations, comes across as self-assured enough to view a powwow with FDR as a meeting of equals. Francis Townsend, a 66-year-old California doctor, campaigned so fervently for help for the aged that he became the godfather of the Social Security system.

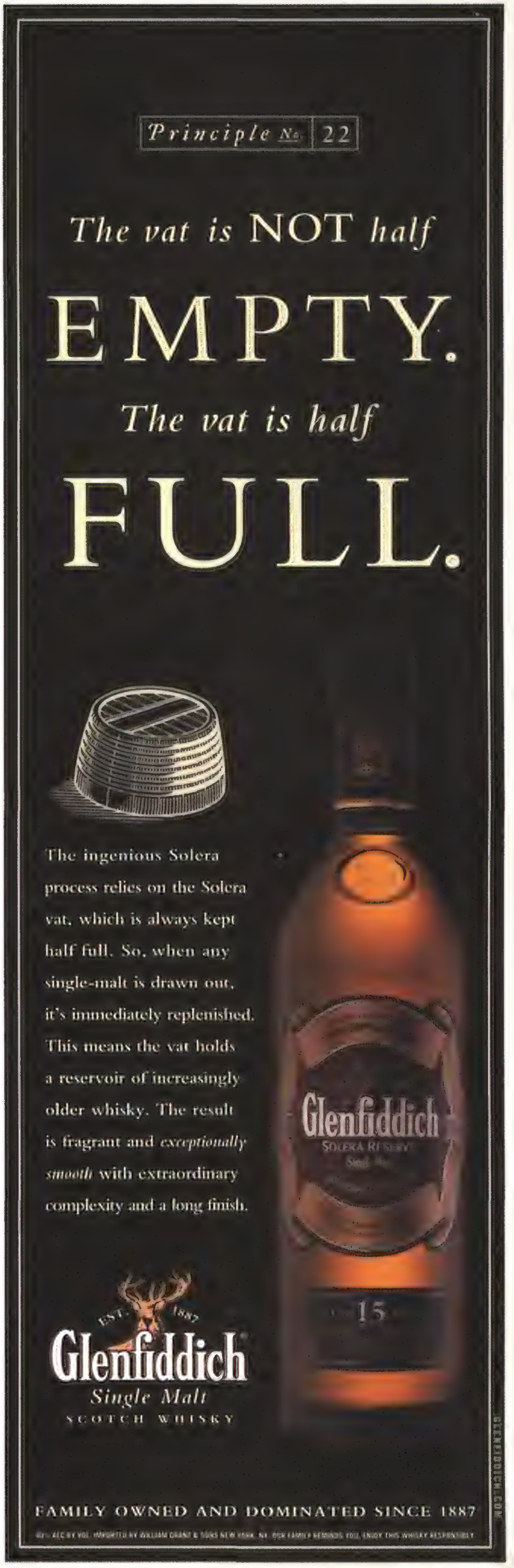
The legacies of the Depression, of course, affect every aspect of our lives. Social Security, the abolition of child labor, the establishment of a minimum wage, the concept (if not much more) of a federal welfare program, the first cracks in the Jim Crow wall in the South—all began in the Depression years. It was a time when the Communist Party in America exploited every issue that could advance the cause of a proletarian revolution in the United States, with pathetically few successes. Watkins' history, refreshingly, shows the Communists as just another player in the contentious arena of the Depression, even though politicians and businessmen fulminated endlessly about Red conspiracies in labor and government.

The New Deal, for all its vision and idealism, was something far less than a makeover of the American way. Old evils persisted: many of the best federal programs, such as the CCC (Civilian Conservation Corps) and WPA (Works Progress Administration), consistently discriminated against black Americans, especially in the South. Though the New Deal's agricultural programs made halting attempts to improve conditions on tenant farms in the South and in migrant labor camps in the West, there was minimal real change. FDR was clearly no Bolshevik. His critics, Watkins writes, "were not inclined to admit Roosevelt's essential economic conservatism, or hear his repeated calls for a balanced budget, or recognize his clear determination merely to refine the capitalist system—not obliterate it and replace it with something new."

But if it is useful to remember the limits of the New Deal, we also should acknowledge the grandeur of its scope and, often enough, the beauty of its intentions.

Watkins, born in the midst of the Depression, helps us understand this while delivering on his promise of telling a wonderfully rich American tale. I knew Tom Watkins and respected him as both an editor and a writer. This book, which may well be the best ever written about the worst of times in America, makes his death last year at age 63 all the more unacceptable.

Reviewer Donald Dale Jackson writes from Connecticut.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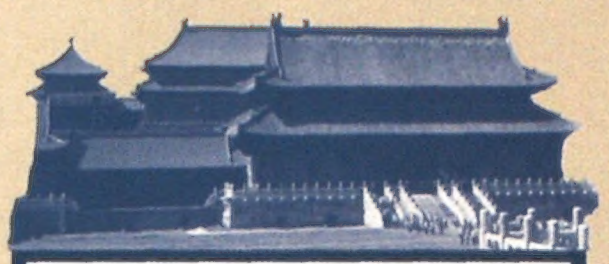

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Attila the Hunk

BY TOM CHAFFIN

"ATTILA'S RESIDENCE . . . WAS MADE OF polished boards, and surrounded with wooden enclosures, designed not so much for protection as for appearance's sake."
—the Roman envoy Priscus, A.D. 448, after visiting Attila the Hun

"Home is where the heart is," says Attila the Hun, dressed casually today in a mice-skin leisure suit for an exclusive interview here at his secluded Danube River retreat. Given the Hun's preference for natural fabrics, it comes as no surprise that—like the renowned plunderer himself—the single-story house is unpretentious, understated, yet somehow one of a kind. Natural light, and lots of it, gives the place a warm, inviting ambiance. "I suppose it's my Asian steppes heritage," speculates the Splendid One. "All those treeless plains of my youth gave me a lifelong appreciation for decor that's simple, and light that's natural and free."

Beyond the ubiquitous human skulls that accent its rooms, the house's appointments betray no hint that its owner presides over one of the world's most notorious barbaric empires. From the Baltic to the Mediterranean, the mere mention of Attila's name strikes a very special kind of terror in the hearts of all. In recent months, however, prompted perhaps by his intuition that if he wishes to be loved as well as feared, he needs to soften his image a bit, the Hun has been aggressively courting scholars and scribes alike.

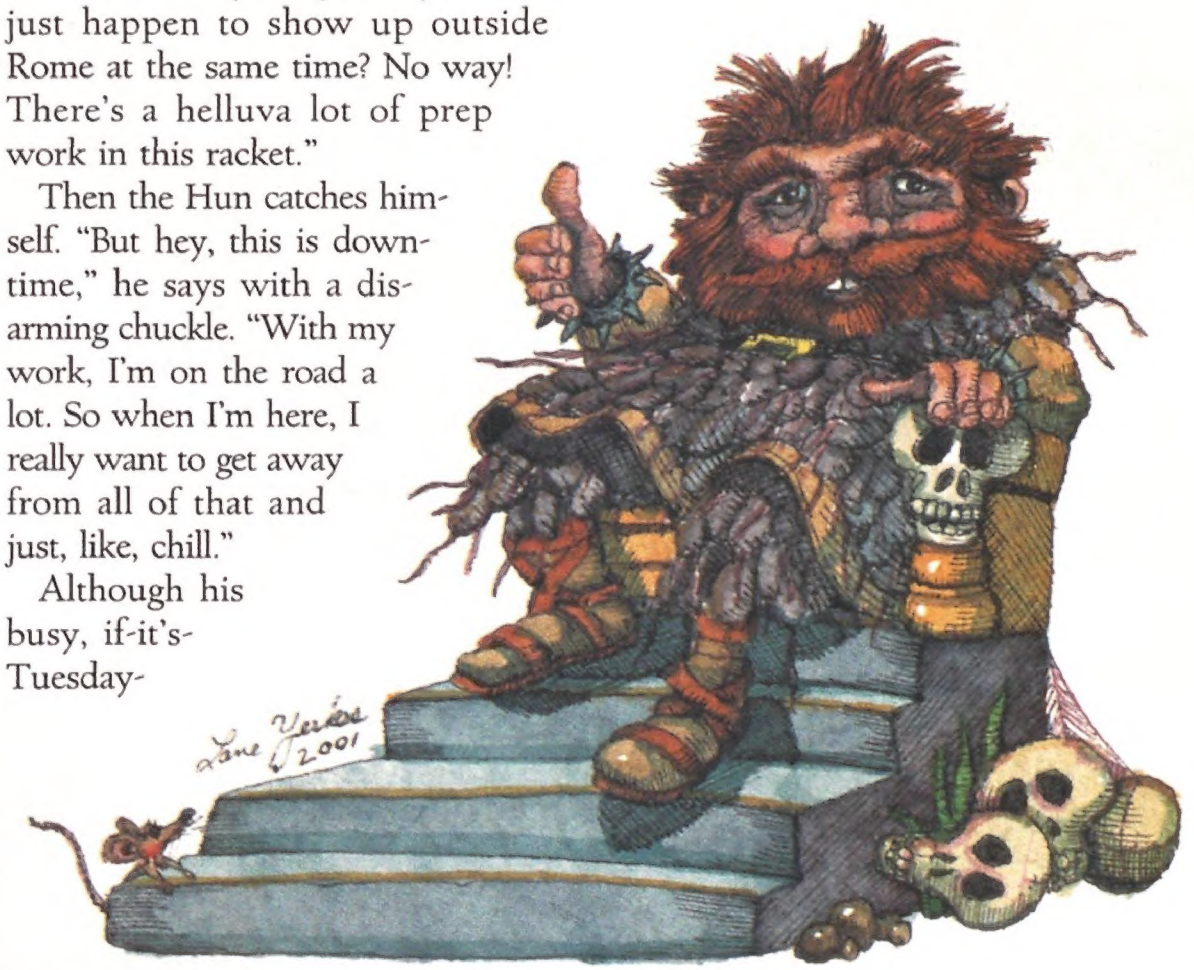
Turns out, there is indeed another side to the so-called Scourge of God. Says one of his neighbors: "The private Attila is not the one you read about in all the epics." Call him a great big hunk of fun, if you wish, because around here the swarthy invader is better known for his awesome dinner parties and tireless work for causes like Habitat for Inhumanity than for his bloody conquests.

And yet, The-One-Who-Never-Showers is hard put to conceal the fact that he's still basking in the glow of his recent victory over the Byzantine army at Gallipoli. "The public sees only the destruction and killing—the glamour end of the job," he says. "They're totally unaware of what goes into these things. Does anyone truly believe sacking campaigns come off by accident? That all the horses, all the soldiers—I call them my associates—and everything else you need just happen to show up outside Rome at the same time? No way! There's a helluva lot of prep work in this racket."

Then the Hun catches himself. "But hey, this is downtime," he says with a disarming chuckle. "With my work, I'm on the road a lot. So when I'm here, I really want to get away from all of that and just, like, chill."

Although his busy, if-it's-Tuesday-this-must-be-Thessaly schedule does not leave much room for hobbies, the A-Man has been devoting more and more time of late to a long-standing labor of love. When completed, his Great Steppes Heritage Museum and Theme Park will house Attila's vast collection of souvenirs, which range from wooden clubs and Roman sandals to the latest version of his "Just Sack It" T-shirts.

As the interview draws to a close, this ultimate self-starter grows pensive. "The steppes have given me so much," he reflects. "All I'm looking for now is the chance to give something in return. Like anyone else in public life, I want to be able to look back at the end of my career and say, 'Yes, I truly made a difference.'"



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